The Builder.

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A Suggestion touching the Public Safety.

THE daily papers are full of not undeserved complaints as to the state of the Thames and its affluents, the Wey and the Lea. Year after year, as the month of August arrives, the like note of alarm is raised, and year after year there is more cause for the alarm. The population increases with a rapidity that is concentrated and intensified in the great centres of population. And there is some reason to fear that one result of agricultural drainage, and of the clearance of timber, is to diminish the regular water supply of our rivers, throwing down more in times of flood and leaving less to flow when it is most required. At all events, the Thames has attained an almost unexampled ebb,—while the demand made on it by the Water Companies is larger than at any previous time.

In the present year, moreover, a new reason for anxiety is given by the terrible ravages of the cholera in Spain. It is but too certain that this disease has lost none of the violence which, on former occasions, has converted its approach into a source of panic. Nor is Spain the only country afflicted. Reticent as the French authorities are on the subject, there is little doubt as to what is occurring at Marseilles, and those who know the state of the basin at Marseilles are aware that it is such as directly to invite the spread of any pestilence that is nourished by filth.

Meantime public writers refer, almost hopelessly, to the number of the schemes which have been brought forward for dealing with sewage. How numerous they are may be estimated by the statement that, in the year 1872 alone, as many as seventy-six patents were applied for for that purpose. It is a suggestive fact that these, and all similar applications, are ranked in the index of the Patent Office under the head "manures." In that fact may perhaps be found an indication of the main cause of the deadlock which has prevailed on this subject, since the first report of the committee on utilisation of sewage in 1858.

The outside theoretic chemical value of the contents of sewage is estimated by Messrs. Lawes and Gilbert at 8s. 4d., and by Dr. Voelcker at 9s. 3d., per unit of population per year. At the same detail prices which give the latter results, the value of a ton of stable manure is 15s. 7½d. As, however, this can be purchased for 3s. (three shillings), it follows that the utmost value obtainable from sewage, by the most perfect chemical process, would be under 3s. per inhabitant, and there is ample evidence to show that the cost of extraction is considerably more than the market value of sewage manure.

By the attempt to secure a gain from what is actually a loss the attention of men of science has been turned from the real desideratum, namely, the most prompt possible destruction of the morbific matter in the sewage. In all processes of precipitation hitherto adopted the whole of the impurities, organic and inorganic, are precipitated together. The result is that the precipitate is putrescible; so that the source of danger is only displaced, instead of being destroyed.

Every inhabitant contributes in the course of a year 71·2 lb. of solid matter to the sewage of his district. Of this, 7 lb. is mineral, 18 lb. is gaseous, and 46·2 lb. is organic matter. It is in the last item that the source of danger occurs.

This organic matter is, roughly speaking, built up of one-half carbon, one-fourth oxygen, one-sixth nitrogen, and one-twelfth hydrogen. It is in the nitrogenous matter, which is generally measured by the quantity of albuminoid ammonia detected by analysis, that the sources of danger, such as putrescible matter, minute organisms, and the germs of disease are found.

If, therefore, chemistry can provide the means of splitting up and decomposing the organic matter, and destroying the germs of disease, in sewage, the difficulty of dealing with the remaining mineral and gaseous matters will be comparatively slight. It is to the object of decomposition and destruction, rather than to that of precipitation and storing up nitrogenous matter, that attention ought, therefore, on this ground, to be directed.

This view of the case has an immediate and very important result.

It is not only known, but the fact is practically in operation, that iron, in various forms, has the property of decomposing organic matter; and not only so, but that of entirely destroying the germs of organic life. Dr. Frankland, an accepted authority on this subject, had experiments made by Mr. Frank Hatton with a view of discovering some material which was capable of destroying these organisms. "He found that the *bacteria* were extremely lively under an atmosphere of pure oxygen; that they enjoyed themselves apparently equally well in an atmosphere of carbonic acid; and they were quite lively in nitrogen; that they did not look much depressed in sulphurous acid; that they got a little dull when put under cyanogen, but in a few days recovered, even from that, and became nearly as lively as ever; but that when they were brought into contact" with water containing a certain dose of metallic iron the *bacteria* became lifeless forms. The mode in which the water was thus charged adopted by Mr. Hatton was by contact with spongy iron; but other modes of applying the mineral, such as magnetic oxide and granulated iron, have the same effect; and Mr. Ogston, a careful experimenter on the subject, says that he derived the best effect from cast-iron borings and turnings.

So practical is the outcome from a long series of observations that, at the present time, the water of the River Nethe, which is much polluted with sewage, is purified for the drinking supply of Antwerp by being charged with a dose of iron not exceeding one-tenth of a grain in a gallon. Ordinary sewage contains about four times as much solid matter as the Nethe water. So that the first step which has here to be taken is to ascertain whether four or five times the dose of iron—or any larger proportion—will have the same effect on actual sewage; and, if so, at what cost and by what method the dose of iron can best be given.

A paper on the purification of water, by Mr. G. H. Ogston, F.C.S., has lately been printed by the Institution of Civil Engineers, and forms part of vol. lxxxi. of the Proceedings. Mr. Ogston gives the result of the treatment of various samples of water, "varying greatly in composition and in the original quantity of organic nitrogen," with iron. The larger portion of these nitrogenous compounds is broken up by the action of the iron, as in the case of the Hertford sewage, where 330 parts of organic nitrogen were reduced to 80 parts. Only a very short time, however, was allowed in these experiments for the action of the iron, which Mr. Ogston states to be "astonishingly rapid." It may be worth inquiry how long the action will continue if undisturbed; as, if so much effect is produced in from eight to ten minutes, it would be very instructive to know what would take place in twenty-four hours. As to this, however, the mode of charging the water with iron, adopted by Mr. Ogston, opposes a certain difficulty.

Space would fail to give, on the present occasion, anything like an exhaustive account of what has up to this time been effected in this matter. Nor, in the absence of such a summary, do we wish to express any very definite opinion, further than this. There is a distinct parting of the ways between the path that leads to precipitation and that which leads to decomposition. By the former method, as hitherto attempted by hundreds of explorers, the grave danger of the maintenance of pu-

trescible matter is in every case incurred. By the latter, on the testimony of Dr. Frankland, Mr. Bischof, Mr. Baldwin Latham, Mr. W. Anderson, Mr. Hatton, Mr. Ogston, and others, not only the putrescible matter, but the germs of disease, are destroyed. Unless the evidence of those gentlemen can be upset, it therefore seems, at least, worthy of inquiry whether by any modification of a process that is said to be thoroughly effective in presence of a certain amount of contamination, a larger amount can be efficiently dealt with. At all events, it can hardly be denied that we should do ill to neglect the indication of what may possibly prove worthy of attention.

EGYPT EXPLORATION FUND.

FIND OF POTTERY AT NEBEIRAH.

IN a past number (*Builder*, May 30th) we welcomed the arrival of the first-fruits of the excavations that for the two past winters have been carried on by English effort in the Delta. First-fruits, we ought to say, of the Greek harvest; for the abundant yield of Egyptian antiquities, and the new light afforded by them on questions of Egyptology, is now known through the length and breadth of Europe. It is the work done by the society for Greek archæology that we desire to emphasise to-day. The Hellenic Society subsidised the excavations by a grant of 50*l*., and we think the Egypt Exploration Fund has amply repaid these modest *θρεπτήρια*. The interest of Greek scholars and archæologists in an exploration in the Delta hinges, of course, on the Greek colony of Naukratis,—Naukratis that had its street of potters, Naukratis which Mr. Flinders Petrie rightly believes he has restored to us from the dead. Our pottery comes to us from Nebeirah,—a name unknown to guide-books and official registers. Nebeirah is within a day's walk of the ancient Sais. In a farm-house within a stone's throw of the mound where Mr. Petrie found the pottery, it will be remembered, that he discovered a stone bearing a dedicatory inscription to the honour of "the city of Naukratis." The presumption is now a certainty that he has really given back to us all that remains of the great trading city of Milesian colonists; the city which held the monopoly of foreign trade; the city of vases and flower-wreaths, twined about, as Athenæus has told us, with "threads of papyrus plant."

In the right-hand wall-case of the fourth vase-room of the British Museum are the contents of a sample case of fragments of pottery which arrived some little time since as a precursor of treasure to come. From these fragments we have selected four of especial interest. We see at a glance that the bulk of these fragments belong to the archaic and black-figured period. Fig. 1 is a familiar figure,

Fig. 1.

Odysseus beneath the ram escaping from the cave of Polyphemus. This design decorates the exterior of a cylix of the early shape. Just such a cylix may be seen in the Fitzwilliam Museum at Cambridge, with the design of Odysseus and the ram imprinted on each side. The designer of the Cambridge vase has, however, added somewhat of scenic effect by placing a spectator on each side of the escaping hero. The scene of the escape of Odysseus is represented, as is well known, in three typical ways. First, the whole scene complete, cave and recumbent giant, with Odysseus and his companions escaping beneath their several rams. Second, the scene abridged to suit a limited space; cave and giant remain, but the fore-part of one ram only with Odysseus beneath it appears. Last and most mechanical, the type on the Nebeirah vase; the cave and the giant disappear, the scene of the escape only is shown, the source of the danger left to the imagination, or perhaps forgotten. This last type is especially popular on the early black-figured cylix. In fig. 2 we have a bit of work of

Fig. 2.

earlier style, and it gains an added value from the fact that it is inscribed. It is a fragment of a figure in close Doric "chiton," the folds of which are indicated by waved lines, while the upper diploïdion (we adhere to the old nomenclature) is of thick material, showing no folds. The letters,—to the left, AΣ, to the right, ANOΣ,—written pillar fashion (*κιονηδον*), are clearly seen. They represent, no doubt, the name of the figure. and the one following. The drawing belongs to the sixth century. In fig. 3 we have a bit of striking realism,—the

Fig. 3.

head of a negro, in all his native characteristic ugliness: thick lips, protruding jaw, pointed skull, receding brow. Just such a type appears on the vase in the British Museum, representing Memnon standing between two Ethiopians. Greek vase-painters, as was natural, seem to have much rather indulged in realistic portraiture of national types than Greek sculptors. No doubt the potter at Naukratis drew from the life. Our last specimen (fig. 4) is the most

Fig. 4.

notable of all: the motive is obvious; we have the fragment of a *χόρος*, maidens linked hand in hand in the dance. It may be at vintage time, a dance such as Hephæstos engraved on the shield of Achilles; or it may be in the dancing-place of the city, such a dancing-place as Dædalus wrought for Ariadne in Crete, a "dancing-place for youths and maidens. Fine linen the maidens had on, and the youths well-woven doublets, faintly glistening with oil." Stiff as the figures are to our modern eyes, to the artist who drew them they were the best effort he could make at a realistic representation of the scene of simple old-world merry-making. Another monument of ancient art will rise to the memory of all,—the quaint naturalistic Phœnician bowl found at Idalium, in which there are seated goddesses and a scene of sacrifice, and also a *χόρος* just such as we have here.

Eight large cases are shortly expected at the British Museum,* and if they are of the degree of interest which we are led to expect, it will seem to the Greek archæologist a fortune almost too great to be true that this Egypt Exploration Fund should yield so abundant a find of archaic Greek pottery.

TALL CHIMNEY-SHAFTS.

THE book brought out on this subject † by Messrs. R. M. & F. J. Bancroft is a disappointing one. It professes to be a practical treatise on the subjects of which it treats, but it is merely an expansion of two papers read in 1878 and 1883, at the Civil and Mechanical Engineers' Society, with illustrations of twenty-six examples of chimney construction, a few general remarks, twenty pages of tables of tests of building materials, from various text-books, and detailed descriptions of about eighty shafts erected in this country, America, and Germany. The authors have been at the pains to put together a mass of information upon various points, but it is not properly tabulated or digested, and they do not appear to have any notion of applying the formulas for determining the size and strength of shafts they have collected from various authorities.

The illustrations are not well selected, and in some cases only show a portion of the shafts. The basement only, and a portion of the capping of the St. Rollox chimney at Glasgow, is given on plate i., and the fine chimney at Broad-street Station of the North-Western Railway, and Mr. Currey's chimney at the Eastbourne Water Works, are represented only by the caps. Descriptions are given of the lofty chimneys at Crossness and Abbey Mills, belonging to the Metropolitan Board of Works, but these are not illustrated, and several notable chimneys within the metropolitan area, such as Messrs. Doulton's on the Albert Embankment, which is 200 ft. high; Messrs. Pontifex & Wood's shaft, Isle of Dogs, 180 ft. high; Messrs. Nobles & Hoare's shaft, Lambeth, 150 ft. high, are unrepresented, drawings of which might have been readily obtained.

The recommendation that the brickwork of chimneys should be laid in mortar for the most part because cement is destroyed by strong heat (p. 11) is erroneous, it being universally acknowledged by engineers that Portland cement is the best material for the purpose. The proviso that 4½-in. work may be constructed in cement is misleading; no portion of the enclosure of a furnace chimney shaft should be less than 9 in. thick, and any less thickness is not permitted within the metropolitan area.

The rule given by Hurst to find the size of a furnace-flue at the top is as follows:—

Let A represent the area of flue at top in square feet;
F Fuel in lb. consumed per hour;
H Height of shaft above furnace-bars in feet.
Then

$$A = \cdot 10 \frac{F}{\sqrt{H}}$$

The size of the flue at the top being determined, if the shaft be given a batter of 1 in 48, it will ensure the requisite stability.

As regards the pressure of the wind, which forms an important element in calculating the strength of chimney-shafts, very little

* Since writing the above, we learn that many of the objects recently discovered by Mr. Flinders Petrie are on view at the rooms of the Royal Archæological Institute, Oxford Mansions, each Tuesday, Thursday, and Saturday till the end of September.

† A Practical Treatise on the Construction of Tall Chimney-shafts. By Robert M. Bancroft and Francis J. Bancroft. Manchester: John Calvert. 1885.

reliable information is given. It appears that the highest pressure registered in this country is 35 lb. to the square foot. This was on the large pressure-board at the Forth, by Mr. B. Baker. This board is placed at a height of about 100 ft. above the sea-level, on an island in the middle of the Forth, and is subject to blasts which it is probable would not occur elsewhere in the British Islands. It is stated that in 1863 a pressure of 43 lb. to the square foot was registered at Liverpool, which would represent a velocity of about 90 miles; but the records of anemometers are utterly valueless for all practical purposes, and it may be safely assumed that the wind pressure in London will not exceed a force of 30 lb. to the square foot. Professor Rankine calculated that the St. Rollox chimney would resist a pressure of 90 lb. to the foot at a height of 360 ft. above the ground.

An unusual type of shaft is that built in 1862, at the South Metropolitan Gas works, Old Kent-road, Mr. G. Livesey, engineer (figs. 65-68, plate 8). This shaft is 108 ft. high from the ground to the top of the cap. The flue is 5 ft. square and is enclosed throughout with brickwork 14 in. thick, the shaft being stiffened at the angles by buttresses 1 ft. 10½ in. wide on the face and projecting 2 ft. 4 in. at the base and running off to nothing at the top. The shaft is 12 ft. square, measured over the buttresses at the base; it diminishes to 7 ft. 2 in. at the top. The cap is of cast-iron and weighs two tons. It is claimed for this system of construction that the buttressed section is stronger than a plain square with an increasing thickness towards the base. A similar section was adopted for one of the loftiest viaducts in this country, the Hownes Gill viaduct, on the Stockton and Darlington Railway. This viaduct is 165 ft. high, and is constructed of piers only 2 ft. thick, strengthened by buttresses at the angles. The cost of this chimney is given as having been 530*l.* complete. A shaft of very nearly similar size at the Saracen Foundry, Glasgow (Mr. Boucher, engineer), built in the ordinary manner in 1862, cost only 277*l.* (p. 99).

In a chimney of a similar character built in 1882, the engineer to the Gas Company carried up the 14-inch work to a height of 50 ft., he then reduced the thickness of the brickwork to 9 in., making the flue of larger dimensions at the top than at the base.

The story of the Newlands Mill Chimney at Bradford, as given by our authors, is instructive, and shows how a chimney should not be built. The chimney was an octagonal stone shaft, 240 ft. high, and 24 ft. wide at the base. It was built for the late Sir Henry Ripley in 1862-3, by Messrs. Moulson & Sons. There were no drawings or specifications prepared; but the following formed the basis of the estimate:—The chimney was to be 80 yards high, the flue 9 ft. diameter, base 24 ft. square, and to have two courses of footings, each 12 in. thick, the first course 28 ft. square, the second course 24 ft. square, on a good bed of concrete. The contractors undertook to execute the work for the sum of 942*l.* 5s. 10d., the foundation and capping to be extras. The site was an old coal-shaft, which was filled up with concrete forming a central pillar 8 ft. 6 in. diameter; round this central pillar were constructed four other shafts, also of concrete, and 6 ft. diameter. Upon the top of these shafts was laid a layer of concrete, 32 ft. 6 in. square, and 2 ft. 6 in. thick, upon which the chimney was built. When the shaft had been carried to a height of 210 ft., it was found to have bulged on one side, and a course of stone 7 in. thick was cut out, and the space filled in with stone slightly less in thickness. This was continued nearly half-way round, with the exception of the angles. The first cut did not have the desired effect, and a second cut was made about 2 ft. above the first, and the chimney was then declared to be perpendicular. About three years after the chimney was completed, it was found to be cracked on the opposite side to the cuts, and was repaired at a cost of about 100*l.* In October, 1882, further cracks occurred, and on the 28th of December the upper portion of the chimney fell killing fifty-four persons, and damaging property to the extent of 20,000*l.*

NOTES.

THE correspondence which has been going on for the last few days in the *Times*, in regard to the state of the river Lea, is somewhat painful reading: a series mostly of recriminations, in which each disputant throws the blame on the other. Mr. Corble, the clerk of the Lea Conservancy Board, does seem to make out a case for his Board, in that they are hampered by legal formulæ, by which their supposed power over local authorities polluting the river with sewage is reduced to a nominal form, by the existence of special "saving clauses" ("ruination clauses" they should be called), which empower certain towns to turn their sewage into the Lea after treating it "by the best known chemical process." The clerk to the Tottenham Board writes a long letter to show that his Board have been very active in suggesting schemes, none of which they have had energy enough to carry out. Of their real amount of energy, and the direction which it takes, we may judge by the statement of Mr. Corble, that after the year's notice required had been served against them for polluting the river, which expired in July last, they had done nothing, and on the Conservancy Board taking steps to enforce the penalty, the Tottenham Board availed themselves of a clause in the Act to remove the case into the Court of Queen's Bench, where nothing can be done till after vacation,—a bit of tactics which had no doubt been kept in readiness for an emergency. The East London Water Company, it appears, expended some of their water in flushing the river last Sunday,—a partial amelioration which has involved the cutting short of the water supply in the district, some residents having been absolutely without water for half a day. Between that and the pollution of the stream, a more hospitable invitation to cholera could hardly be imagined. Sir J. Bazalgette states that a plan for intercepting the whole sewage of the Lea valley, and the proper purification of the sewage, has been prepared by Messrs. Law & Chatterton and himself, which could be carried out at a moderate cost, if the towns draining into the Lea would combine. This appears to be just what they will not do. It is every one for himself, and in any case the scheme would take years to carry out. A suggestion has been made that the Lea sewage might be connected to the Metropolitan drainage system in a brief space and at moderate outlay, but Sir J. Bazalgette says they can accommodate no more sewage at Barking: *sat prata liberunt.* The only tolerably immediate means of amelioration seems to lie in compelling the Tottenham Board to adopt more extensive and efficient processes of purification. The combined intercepting scheme should be carried out in the long run, and forced, if necessary, on the unwilling townships, who cannot agree for their own good. But it would be as well to know exactly what is to be done with the sewage in its ultimate destination before taking it there. We do not want another Barking in miniature.

THE melancholy occurrence at Dawlish this week is one of those events which the average British juryman likes to return as "accidental death," but which has no right to be included in the chapter of accidents at all. There may be difficulty in bringing the responsibility home legally to any one, but morally the local authorities, who neglected urgent warnings and allowed unsuspecting visitors to stroll under cliffs in a dangerous state, without any warning or notice of their danger, are under a very heavy responsibility for the loss of life in so painful a manner this week.

THE Report of the Metropolitan District Railway is the most gloomy of the railway revelations of the half-year. An increase of 11,800*l.* in working expenses, and of 12,703*l.* in interest and rentals, comes upon a diminished revenue; and the divisible balance for the half-year is reduced from 39,800*l.* to 15,000*l.* It is all very well to urge a fusion with the Metropolitan line as a remedy. The present, however, would be a bad time for attempting to open such a negotiation, and although cost might, to some extent, be diminished, and unity of action might be attained by such a measure, the cause of the depression of value of the property lies deeper, and has to be looked in the face. This is the competition of the omnibus traffic. Passengers are taken by omnibus from Liverpool-street to Charing Cross for 1d., and to Kensington or to Hammersmith for 6d. For such charges they can not, the Chairman of the District Company says, be carried by rail. It is but too probable that such is the case. The actual cost of transport on the Metropolitan Railway, including maintenance of way and all the charges, is only one-third of that by omnibus. But while a profit of one-seventh of a penny per passenger is enough to give a 10 per cent. dividend on the small capital of the Omnibus Company, ten times that amount is required to pay 5 per cent. on the large capital of the Railway. This is an acute form of the danger which the Belgian economist, M. Le Hardy de Beaulieu, has pointed out as intimately connected with the growth of railway capital. The cost of 680,700*l.* per mile, at which the District Line stood in the last number of the "Index to our Railway System," is a terrible item to look in the face. Something of the same kind is going on over nearly all our railways; but the District Railway, as substantially a one-speeded line, avoids one of the chief causes of unprofitable working. On the other hand, the frequent stoppages are very costly. If alternate trains stopped only at alternate stations the expenses might be sensibly reduced, but any such expedients would interfere with the convenience of the travelling public.

WE referred the other day to the spirited suggestion of two engineers to take Canvey Island in hand as a depôt for the London sewage, but among the "summary of reasons" in favour of the scheme, just published, some question must be made about Nos. 13 and 14, at all events. The island, we are told, while retaining the solid portion of the sewage in earthen basins, will afford an opportunity of its conversion into a saleable manure for the benefit of the ratepayers of the metropolis, whenever advancing science shall develope the means of doing so with profit." That we should be asked to go on building up an immense dung-hill until some brilliant discovery shall enable us to utilise it, would be more comfortable advice if science were not obstinately pointing in the opposite direction. Dr. Voelcker, whose authority on the subject is classical, reported on the experience of Bolton, Bradford, Leeds, Coventry, Rochdale, and Halifax, that "the production of one ton of dried sewage deposits, apart from the costs of the precipitation agents which are used, entails an expense of about 30s. for each ton of portable dried sewage manure." "The market value of one ton of the treated sludge," the same writer estimates at from 4s. 6d. to 6s. 6d.; and, in 1873, Sir Joseph Bazalgette reported to the Metropolitan Board of Works, as the result of experiment on 11,672,737 gallons of sewage at Crossness, that "the cost of manufacture, taking the dried and wet residues as perfect 'guano,' was 6*l.* 16s. 6d. per ton, exclusive of rent, interest on capital, depreciation of plant, and other items"; and that "the value of the manure, as judged of by its chemical composition, does not exceed 20s. per ton."

THE Railway Report of the Board of Trade for 1884, just issued, loses most of the practical value that it might otherwise have from the unaccountable delay attending its preparation. Not only has all the information that it contains been in the hands of the public, in the form of the January reports of the various companies, for some months, but the like information as to the results of the working of half of the present year has also been communicated, in detail, to the shareholders. Thus, when Messrs. Calcraft and Giffen speak of the results of 1884 as being "less satis-

factory than for the last two or three previous years," their readers are in a position to add that the results of 1885 are less satisfactory than those of 1884. The main items of the report are but too familiar. Increase in cost per mile adds 2 per cent. to the capital, while only 1 per cent. has been added to the mileage. A decline in bulk of merchandise transported of 1½ per cent. contrasts with an annual increase of 2¾ per cent. from 1873 to 1883. More passenger-traffic has been conducted for less income. A falling off of 509,000*l.* in receipts has only been lightened to the extent of 132,000*l.*, by economy in working expenses; the loss of 377,000*l.* thus indicated, together with the fresh charges on 16,543,000*l.* more capital, falling on the holders of the 299,000,000*l.* of ordinary stock. In face of all this proof both of decline of business and of decline of price, it is small comfort to be told that "real business has not decreased so much as the figures of the nominal business expressed by money values have decreased."

HOWEVER conflicting may be the various opinions as to the architectural features of those portions of London now undergoing reconstruction, there can be no room for divergence as to the vast improvement from a social and sanitary point of view. Londoners of even very few years' standing may well be surprised at the wholesale demolition of certain populous districts, like Soho and St. Giles, while those who have not seen them for a decade or so, would be aghast at the transmogrification going on all round, and the disappearance of so many old, if somewhat shabby, landmarks. The steeple of St. Anne's, Soho, at present overlooks a desert of empty building ground between Leicester-square and Holborn, so bewildering in its monotony that even residents may be pardoned for losing their way. Newport Market, one of the dirtiest and most disreputable neighbourhoods, has almost vanished, and its place is taken by respectable, if not very ornamental, blocks of model dwellings, while similar changes are going on in Whitechapel, Gray's Inn-road, Drury-lane, and several other quarters. Slums, of course, are still existing, and will always exist in every large city; but they are now rendered more manageable and less active for harm than they were before, their continuity, so to speak, being broken, and supervision rendered much more easy. Moreover, it is impossible that the mere contiguity of clean and decent houses, such as the industrial dwellings in Great and Little Wild streets, should not exercise a wholesome influence on their neighbours, both morally and physically; and in this respect the embellished churchyards and open spaces are all assisting in a very desirable object. Nor do we think that any real or sentimental injustice is perpetuated by the driving away of the rookery inhabitants, who are seldom *bonâ-fide* work-people. They will naturally migrate to other sympathetic spots, but, perhaps, in course of time, the Ethiopian may change his skin, and the slum-dwellers become comparatively respectable from the difficulty of finding house-room suitable to their old condition.

THE difficulties of that section of sanitarians who believe in sewage farms as the best way of solving the ever-present drainage questions, will not be lessened by a decision given the other day at Birmingham Assizes. A farmer occupying some fields at Ipsley, on the banks of the Arrow, sued the Redditch Local Board for 72*l.* damages for the loss of a colt alleged to have been poisoned by the polluted effluent water from the Board's sewage farm. The charge against the farm was, that it was too small for practical purposes, being only four acres for a population of 8,000, and that it was badly managed, the crude sewage running away unfiltered. The defendants, on the other hand, contended that, if the colt really died from drinking bad water, it was due to a mess of "pottage" or refuse from the needle and paper works that are so numerous in that neighbourhood; that the farm was laid down in strict accordance with the plan recommended by the Royal Commissioners, and that the water, as evidenced by many samples, was fairly pure and harmless. In addition to the action for damages, the plaintiff applied for an injunction to prevent the Redditch sewage being allowed to flow into the Arrow. Practically both cases were given in his favour, although, fortunately for the Board, he was debarred obtaining the 72*l.* in consequence of his having failed to bring his action within the specified six months after the damage was committed. He was, however, successful, as a riparian owner, in his application for an injunction, and he was also allowed the costs of the action. It certainly seems hard that a sewage farm, confessedly dealing with a great public evil, and not established for a profit, should be punished, while other manufacturing pollutions, which, in the majority of cases, are far more injurious, are permitted to go unchecked. When the difficulties that attend the sewage disposal of a population under 10,000 are so great, how infinitely more perplexing must they be when the population is counted by millions.

WE have had occasion before (*Builder*, April 13, "Smaller Classical Museums of Central Italy") to call attention to the valuable and but too little-known collection of ancient pottery in the possession of Count Faina at Orvieto. We are glad to see that one of the most curious bits of work in his possession is now made public property by its publication in the Annali (Tav. d'agg, C) of the German Archæological Institute at Rome. The interest of this specimen is that it seems to be a sort of meeting-point between the rudest possible hand-turned Italic pottery and the system of decorative motives we are accustomed to associate with the Etruscan. The centre design of the vase (a rough amphora) consists of a succession of winged female figures stamped on the pottery. A glance shows that this female winged figure is own cousin to the Asiatic winged Artemis. Below a frieze of animals is stamped, but, so awkward was the workman, that he has stamped them upside down. With this vase is published a similar specimen, but of more advanced workmanship from Chiusi. We all go to Orvieto to study Luca Signorelli; if we are wise we shall cross the cathedral court and visit the Faina collection, and that soon, for with a private collection it is often now or never.

THE Museo Greco-Etrusco in the Via Colonna at Florence holds a high place among the Museums of Europe, not only for the great riches of its contents, but also more especially for the perfection of its scientific arrangement. To label a monument Etruscan has been too often considered as sufficient attempt at classification. Professor Luigi Milani, the director of this museum, thinks otherwise. He is at work on the chronology of the quaint black ware, "bucchero nero," which fills three large rooms of the museum, and he has just published, in the "Museo-Italiano di Antichita Classica," i. 3a, 1885, under the title of "Monumenti Etruschi Iconici," a very interesting monograph, which can be heartily recommended to all students of ancient portrait art. In Etruria as in Egypt, sepulchral monuments were largely prompted by the desire to produce a vivid likeness of the dead. In Etruria, as in Egypt, the tendency to realism inherent in the nature of the people, and fostered by religious conviction, for ever stifled any promptings to idealism. The subject has been, as regards Egypt, almost written to death of late, but the classification of Etruscan portraits is virgin soil. The monograph is beautifully illustrated by thirteen phototype plates, and is clearly the forerunner of a larger work.

SINCE the irruption on the 11th of October, 1883, of the water into the Severn Tunnel, the works have been conducted in so silent and undemonstrative a manner that the announcement of the opening of this great work for traffic will come upon most readers as a very pleasant surprise. We conclude that a history and description of the work is in course of preparation for the Institution of Civil Engineers, and that the desire not to anticipate this paper has led to a reticence which is unusual as to works of so much magnitude. Although every half-year that passes adds fresh proof that the shareholder too often suffers when the engineer is glorified, we cannot withold the admiration due to the accomplishment of a bold and dangerous work, regarded as a piece of engineering, whatever be its financial wisdom. In fact, in a case of this kind a company may be said to be serving the public at their own cost. Where, as in the case of the South Wales traffic, there is little or no railway competition, it would seem but a shortsighted policy for a company to diminish their income, and increase their capital, by cutting off a loop or working line. That the extra trade to be brought on the line by such increase of facility will pay for the increase of capital, is, we think, more than doubtful. But that for the military defence, and probably for the commercial convenience, of the West of England and of Wales, the under-bridging of the Severn is an important step, is very manifest.

THREE very useful processes have been set forth in *La Nature*, one of which, by M. Prischer, of Nuremberg, is for applying a black coating to iron resembling enamel, but more adhesive and elastic. Powdered coal is put into a box, sufficient to cover the bottom to about three-quarters of an inch, and over this is a grating for the reception of the articles to be coated. The box is then hermetically fastened and placed over a fire, when the moisture in the coal evaporates, giving off thick bituminous vapours. After keeping the box at a dull red heat, it is opened, when the coal is found converted into coke, and the iron articles coated with great regularity. They have the advantage of being able to be bent or exposed to great variations of temperature without the coating being in any way affected. The second process is for ebonising wood by immersing it for a certain time in a solution of permanganate of potash. When dried, a beautiful tint is left, which becomes quite brilliant after a little friction, while a weak solution gives a violet colour. A cheap artificial ivory is now obtainable by a method which should supersede the old system of injecting white wood with chloride of lime under strong pressure. Under the present plan, bones and waste pieces of deer and kid skins are macerated and then bleached for a fortnight in chloride of lime. After this, they are heated by steam, so as to form a fluid mass, to which is added a certain proportion of alum. The mass is then filtered, dried in the air, and hardened in an alum bath, the result being white, tough plates, extremely workable, and economical to produce.

SOME time since we commented on a trade circular, which was sent us almost simultaneously by several architects, from a firm who offered commissions for placing work in their hands. An Associate of the Institute of Architects has just sent us another document of the same kind, headed "The Lancashire Telluric Cement Co.," and containing the sentence, "If you can influence business among your clients, or specify for its use in your specifications, we shall be pleased to allow commission." Our correspondent, who encloses this obliging offer, observes "It is intolerable that the profession should be insulted in this way." It is intolerable; and if architects who receive these offers of bribes for the use of special materials will forward them to us, we will make public the names of those who attempt to bribe, and that will perhaps put a stop to the practice. The position of an architect, we may explain to the "Co." in question, is that of an independent adviser in the interests of his client, and not that of a tradesman; and he has no right to have any interest in view except that of his client. To send round a circular of the kind alluded to is simply to invite professional men to do a dishonourable thing; and if the tradesmen who make such offers do not know that, the sooner they learn it the better.

LETTER FROM PARIS.

SINCE our last letter, the Government has officially laid the first stone of the monument destined to replace the ancient Sorbonne. This ceremony afforded the opportunity to confer a decoration on M. Nenot, and every one has applauded this honour to a man of talent still young, and whose ability has been already, both at Rome and at Paris, so completely established. The immense constructions which the State, sharing the cost with the town, is raising here, will completely modify this corner of old Paris; and if the archæologists regret this change in the physiognomy of the "rive gauche," the professors and students, on the other hand, see with satisfaction the carrying out of a metamorphosis long denied, and which will give to the University of France a home worthy of it.

Paris is, besides, on the eve of witnessing other important improvements. Without mentioning the Metropolitan Railway, the realisation of which is too long delayed, the Municipal Council has at last perceived that the only way to put an end to the labour crisis which presses so heavily on Paris is to take in hand large works, and itself to give the necessary impulse thereto. Accordingly, before separating for the annual vacation, it has voted extra supplies which will permit both the completion of the system of sewers and the improvement of roadways, the creation of new scholastic establishments (*lycées* and *écoles*), the completion of the Palais de Justice, the École de Médecine, and the Hôtel de Ville, the reconstruction of the Mairies of the 8th, 10th, 17th, and 18th arrondissements (which have become notoriously inadequate), the rebuilding of the Morgue, with freezing apparatus for the preservation of the bodies; and lastly, the setting apart, for the Exhibition of 1889, and the Centenary fêtes, of a sum of about twenty-six million (francs). Here is a plan of campaign in which, as will be seen, architecture plays a considerable part, and to which, on that account, we shall have occasion to return from time to time.

In the matter of inaugurations we may mention that of the monument erected at Mans to the memory of Chanzy. In our notes on the *Salon*, we spoke of the sculptures which are to decorate it, and return to the subject only to remark that nothing can be worse, in such a case, than to divide the work and entrust the sculpture to two artists of diverse temperament, whatever may be their individual talent. M. Crank has seen in the figure of Chanzy no more than that of a general officer meditating, in the leisure of a garrison depôt, his rounds of annual inspection, while M. Croisy (who, by the way, is also to receive a decoration) is inspired by the memories of battles and of the heroic resistance of the Army of the Loire. The result is a disagreeable contrast, an absurd anomaly, between the fury of the figures on the pedestal and the placid aspect of the statue which surmounts it.

Among the new members of the Legion of Honour are not only M. Croisy, but also two architects of ability, MM. Lucien Magne and Marcel Deslinières. M. Leon Parville, the able and learned ceramic artist, who, for twenty-five years has been engaged in advancing the art of decorative faïence, was also to have received the cross, as a sequel to the exhibition of the Union Centrale, when a painful disease which had long threatened him carried off this conscientious artist, whose name will not be forgotten in connexion with the application of ceramic decoration in modern buildings. It was to him that we owed the decoration of the Paris pavilion in the Exhibition of 1878. Another nomination which public opinion has ratified is the election of M. Daumet to the Académie des Beaux Arts, in place of the late M. Ballu. Thanks to M. Charles Yriarte, readers of the *Builder* have been made acquainted with M. Daumet's admirable work in the restoration of the Château of Chantilly.

In connexion with the Académie des Beaux Arts, we may mention the architectural competition for the *Prix de Rome*. The subject, as already mentioned, was the design for an Academy of Medical Science, and the prize has been carried off by M. François André, pupil of his father. The first second-grade prize has been awarded to M. Albert Devienne, pupil of MM. Coquart & Guerhardt, and the second to M. Louis Louvet, pupil of his father and of M. Ginain.

The Antwerp Exhibition has also brought to the young French architects its harvest of prizes. The *médaille d'honneur* has been adjudged to M. Louis Bernier. M. Albert Ballu has obtained a medal of the first-class; MM. Courtois-Suffit & Calinaud medals of the second and third class. M. Courtois-Suffit, who has gained many successes in the École des Beaux Arts, obtained also two years ago a "bourse de mérite" from the Department of the Seine.

After Voltaire, Jean Jacques Rousseau; the thing was inevitable, and Paris will have statues of both these celebrities. The decision will shortly be given on an open competition for a monument to the latter. From the sixty-four competitors the jury, among whom are MM. Mercié, Chapu, Captier, Guillaume, Louis Noel, and Étienne Leroux, have selected three sketches by MM. Berthet, Larche, and Steiner. These three artists will produce a second set of competitions, to be submitted on December the 15th, modelled in clay, one-fourth the scale of the intended work, and only then will the final selection be made and the commission placed in the hands of the chosen competitor. M. Berthet has already obtained the prize in an open competition last year for the statue of Étienne-Dolet; and M. Steiner is the author of the statue of Ledru-Rollin, erected in the *Place* Voltaire, and which was also the subject of a public competition.

We hope these gentlemen will not have eventually to encounter the administrative and financial difficulties against which M. Dalou is obliged to contend in completing his fine work the "République," of which the *Builder* has given more than one illustration. It appears that this artist requires for the proper accomplishment of his work in detail the method of casting *à cire perdue*, the superiority of which has been long recognised, and which, as is well known, was employed with great success by the artists of the Renaissance. Unhappily this will raise the cost 110,000 francs beyond the sum originally allowed for the work,* and as the estimated expenditure has been already considerably exceeded, and the execution of the models has cost more than 100,000 francs, the Administration hesitates, the Municipal Council is silent, M. Dalou is very positive, and *adhuc sub judice lis est*: a serious delay very prejudicial to the completion of this remarkable work, intended, as we have said, for the Place de la Nation.

In spite of the temporary stoppage, M. Dalou is more fortunate than Messrs. Coutan and Formigé, the authors of the design for the commemorative monument to be erected at Versailles; it is nearly four years since that competition was decided, and the two chosen competitors have not yet been able to obtain the authority of the State to commence their work: more fortunate, too, than M. Marque de Vasselot, who, the day after the death of Lamartine, was commissioned to execute the statue of the poet, and who is now obliged to demand in the law courts the payment of the amount promised him by the Subscription Committee.

Whilst at the Musée de Cluny the workmen are putting the last touches to the orangery, now transformed into a permanent museum of painting and sculpture, the Ministère des Beaux Arts is preparing to take over the curious collection of antiquities,—Greek, Egyptian, Gallo-Roman, and Indo-Chinese,—which M. Guimet has presented to the nation. The new museum will be near the Trocadéro, in a palace which M. Guimet has engaged, on conditions to be approved by Parliament, to complete within three years. We do not know who is to be the architect.

The comparative stagnation in this holiday season does not give occasion for much artistic news. We may notice, however, certain works of sculpture which the Council have commissioned for the interior decoration of the Hôtel de Ville.

Among these may be numbered the complete decoration of the vault of the large "Galerie des Fêtes," for which the bas-relief, caryatides, garlands, and other ornaments are to be entrusted to thirteen sculptors of repute,—MM. Berthet, Boisseau, Boucher, Croisy, Debrie, Dumaige, Germain, Mariston, Moreau-Vauthier, Michel, Perrin, and Sobre. The expense is estimated at 85,000 francs, not including, be it understood, the pictorial decoration of the ceilings, which the Commission des Beaux Arts proposes to confide to MM. Hébert, Delaunay, and Ferrier.

M. Ernest Barrias, who is just completing for the decoration of the "Escalier des Fêtes" two beautiful statues in marble symbolising "Le Chant" and "L'Accompagnement" (a very charming and *spirituel* idea), has been also commissioned to execute the bust of the lamented Ballu, which will be placed in the vestibule of the "Escalier d'Honneur," on a pedestal to be designed by M. Formigé.

Lastly, M. Marqueste, who, on the death of Idrac, was commissioned to complete the statue of Étienne Marcel, commenced by the late sculptor, has finished the model, which has been accepted by the Commission des Beaux Arts, and will be shortly cast in bronze, to be placed in the garden of the Hôtel de Ville.

We may hope now that the winter will not pass without the Municipal Council settling the important question of the historical paintings for the Hôtel de Ville. It has great interest for French artists, and a prompt settlement of the matter is an absolute necessity if the Hôtel de Ville is to be completely ready for the grand *fêtes* of the centenary of 1789.

Though the works left by Bastien Lepage were sufficient to keep alive the name of the painter of "Les Foins" and "Jeanne d'Arc," we hear with great pleasure that a subscription is to be opened among artists for the erection of a monument to him in his native village, Damvillers. The friends of Bastien Lepage have enlisted the well-known talent of M. Rodin, the sculptor, for the execution of the cenotaph, and M. Cazin, the painter, has offered to give the design for a commemorative plaque in bronze, to be placed on the house where he was born.

Paris, which has given to one of its streets the name of Bastien-Lepage, is equally desirous to do posthumous honour to the memory of Berlioz, whose statue is to be erected in the square Vintemille. M. A. Lenoir, from whom the Administration bought last year, out of the *Salon*, a pretty figure entitled "Une Mère," is putting the finishing touches to a statue representing Berlioz in an attitude which was frequent with him, standing with his elbow on a desk and his head leaning on his hand. The work is full of life and spirit, and M. Lenoir has well rendered the mobile and nervous physiognomy of the musician. The young sculptor, we may add, is a grandson of the celebrated Albert Lenoir, to whom we owe the preservation, in the Musée des Grands Augustins, of so many of the historical monuments which had been scattered far and wide in the revolutionary tempest of 1793.

We may mention that in 1886,—that is to say, in a few months,—the Académie des Beaux Arts will adjudge the biennial prize founded by the late M. Duc, who in instituting this competition wished, according to the words of his will, "that the young French architects should make a fitting application of architecture to our modern manners and customs, endeavouring to discover the essential elements, the various special qualities, which in many former epochs of the art had given rise to works which command universal admiration."

THE BRIGHTON CONGRESS OF THE BRITISH ARCHÆOLOGICAL ASSOCIATION.*

WE brought the narrative of the proceedings of the Brighton Congress to the close of the first week's proceedings in our last. Two additional days of the following week, Monday, the 24th, and Tuesday, the 25th, were devoted to interesting excursions, and were largely attended, fine weather being experienced on each of the days.

On Monday the party proceeded to Lewes, to inspect some of the objects of interest in the quaint old town, the first being the parish church of Southover, erected beside the entrance gateway of the great Cluniac Priory founded by Earl de Warenne and his wife, Gundrada, in 1077.

The church has a nave and aisles, a chancel, just completed, and a heavily-built brick tower, erected at the beginning of the eighteenth century. The modern memorial chapel to the Earl and Lady De Warenne is on the south side of the church, and it contains the elaborately-wrought slab which covered their remains in the chapter-house of the adjoining priory, and also the leaden cists in which their remains were found in 1845, when the railway to

* It ought to be done, whatever the cost.—ED.

* See pp. 252, 286, *ante*.

Brighton was formed. These were inspected, and a move was then made to the site of the famous priory, now traversed by the line of railway. Masses of walling are to be seen in all directions, having the peculiarity of one period of Norman work being built into a later period, while there is a good deal of still later work. Without a clue the remains are difficult to make out, from the fact that while the large priory church was on high ground, the monastic buildings were in a lower position, and raised on a basement up to the level of the church, or nearly so. The clue has been rendered by the plan prepared by Mr. St. John Hope, giving the result of the recent excavations made under his direction. This plan was exhibited by Mr. Loftus Brock, who bore testimony to the value of the researches carried out by that gentleman. The work presents some valuable and curious features, the most remarkable being the evident signs of enlargement in Norman times. The wall arcading of a large western tower is laid bare in a private garden, where there is also the terrible subterranean prison for refractory monks known as the "lantern," approached by a narrow passage. After partaking of light refreshments at Southover Grange, a house of sixteenth-century date, erected out of the remains of the priory, and now the residence of Mr. Thorn, the mayor of Lewes, the party proceeded to the ancient castle of the town,—a ruined shell keep, like so many other of the Sussex castles, and standing upon a conical mound. There is another mound within the castle area, both being entire, wholly artificial or natural hills scarped and shaped by human agency. This occurrence of two mounds in one building is very remarkable, and the more so since they are both, probably, of ancient British date. A third mound, Mount Calvary originally, in the Priory grounds, is doubtless of sepulchral origin. The castle is now occupied by the Sussex Antiquarian Society, and the party being assembled the history of the building was related by the Rev. Mr. De Putron, an active member of that Society. Sir James Picton, F.S.A., then proposed a hearty vote of thanks to the Sussex Society for their having courteously thrown open the castle for inspection, and he dwelt upon the cordial feelings which had existed for so long a period between the two societies. He was followed by Mr. Geo. R. Wright, F.S.A., the Congress secretary, who stated that the short visit to the house, so to speak, of the Sussex Society was rendered as a compliment to them, and as some sort of recognition of the Association's value of the cordial feeling between the two societies. The Mayor of Lewes responded, expressing the thanks of the sister society.

After passing down some of the steep lanes of the town, the station and train were reached, and after alighting at Berwick Station carriages in readiness took the party to Alfriston, where the church and the ancient parsonage-house were inspected, luncheon being partaken of in the quaint old hostelry, the Star, a building of the sixteenth century, adorned with singular carving. The picturesque group which this building makes, with the old village cross in the distance, tempted many a sketcher to linger over its beauties long after the horn of the Congress Secretary had sounded. Wilmington Church was next visited, together with the remains of the small alien Priory, to which it had been attached, the church being probably an example, of which there are several in the county, of a double use, one portion being parochial, the other monastic. The church has been recently well restored by Messrs. Paley. The gateway, now in ruins, is of later date than the monastic use of the building, and is part of an Elizabethan house erected on the site.

Tea was offered to the party by the Rev. W. St. John Deasly.

The celebrated Wilmington Giant, a huge figure, having each hand resting on a pole, was only partially visible cut in the side of the chalk hill, about a mile from the church, the growth of grass having obliterated it in the comparatively short space of time since it was last cleared. One of the poles and one arm alone were visible.

Proceeding to Polegate Station, the train took the party to Pevensey, where the remains of the ancient Roman fortress were described by Mr. Round, who read a paper on the spot.

The excavations made a few years ago by Mr. Roach Smith, assisted by Mr. M. A. Lower, were described, and the way in which the builders of the Edwardian Castle engrafted their building on to the old Roman walls was dwelt upon. The return journey to Brighton was made at a late hour.

On Tuesday a long journey was made to Worth Church, where the fine Saxon church was inspected by a large party, and described by Mr. Loftus Brock, F.S.A., who called attention to the details of the building in support of his theory that it was added to in Saxon times rather than being built at one period. The whole of the walls are Saxon, pilaster strip projections appearing in all of them. The transepts are of lower height than either nave or apse. The appearance of the old timbered spire is shown by a view in the loan collection at Brighton, but the present tower and spire are of stone of recent date. The pulpit is a very fine piece of Flemish carving, dated 1577, and the continuous communion rails are also elaborately carved. The Rev. Mr. Bankes explained the recent restoration of the church, when the Saxon apse was rebuilt, and Sir James Picton thanked him for his reception of the party. Resuming the carriages, Crawley Church was visited. It has a very characteristic square tower of Perpendicular date, and there is a fine roof of the same style to the earlier nave, one of the beams being inscribed with the following inscription in large old Gothic lettering:—

"Man in wele be whar, for wardly good makyth man blynde * be whar be for what comyth be hynde."

(Beware before what cometh behind.)

A long drive was then taken across what was once a portion of the great Forest of Tilgate, the county being still well wooded, and Cuckfield was reached in due course, where the fine church was inspected. It is a large building with a nave and side aisles of varying dates, a chancel, and a bold western tower, having a tall well-proportioned wooden spire. There is a clearstory to the nave, but it is hidden by a roof which covers alike the side aisles and nave. The charming old Jacobean House, Cuckfield-place, was thrown open for the inspection of the visitors and greatly admired, not only for its artistic appearance but for its being the house so graphically described in Harrison Ainsworth's "Rookwood." It is approached by an avenue of trees and has a singular little gateway flanked by four octagonal turrets at the angles at the end of the avenue. A visit was then paid to Ockenden, another old house of a later period, one portion being dated 1652. It is now the seat of Mr. Boord, M.P., and its stone-built front, with mullioned windows, presents a remarkable example of the use of Jacobean or Elizabethan forms at a later age. By invitation of Mr. and Mrs. Boord, the party partook of tea and refreshments.

The carriages were then resumed for the last time, and Brighton was reached in due course.

Thus has ended one of the most pleasant of congresses. The weather was everything that could be desired, the programme included places of considerable interest, and the papers were lucid and good. These attractions resulted in the daily meetings being well attended, while the arrangements for carriages and express trains passed off without impediment. One result was certainly attained by many of the visitors, who were agreeably shown what a great variety of objects of study there are at our doors, so to speak. Many of the *habitués* of Brighton appeared to be unaware of the existence of the remarkable fortified hills so close to that fashionable watering-place, or of the great number of interesting churches close at hand or within easy distance.

Deep Well Boring in London.—A bored tube well, 300 ft. deep, lined with extra strong wrought-iron tube, from the surface to the chalk, has recently been completed by Messrs. Isler & Co., on the premises of the Belfast and London Aërated Water Company, on Bankside. The chalk was reached at 204 ft. from the surface, after passing through 36 ft. of peat and gravel, 75 ft. of London blue clay, 93 ft. of mottled clays, and light and brown sands, with pebbles (Woolwich and Reading beds). Many objectionable springs were met, especially in the gravel bed overlying the London blue clay. These have been safely excluded from the well by means of the tubes, which are of even size, driven some distance into the chalk, preventing, therefore, any percolation from above. The supply is pumped direct from the chalk springs, and at the rate of 72,000 gallons per day. The same engineers have a contract for a 400 ft. or 500 ft. bored tube well for the Ealing Local Board.

PROVISIONAL ORDERS UNDER THE PUBLIC HEALTH ACT, 1875.

THE Local Government Board, deeming it desirable to follow a course similar to that adopted by them for several years past, and to fix a day before which all applications for Provisional Orders under the Public Health Act, 1875, or the Artisans' and Labourers' Dwellings Improvement Act, 1875, must be received, have issued the following instructions, which have been forwarded to the Clerk of each Sanitary Authority in the country, accompanied by a circular, in which it is stated that the dates mentioned are only fixed as the latest at which applications for Provisional Orders can be received. "It is not the intention of the Board," says the circular, "to interpose any obstacle in the way of these applications being made at earlier periods. On the contrary, where any Sanitary Authority propose to apply for a Provisional Order, the Board would wish them to make their application as soon as they are in a position to furnish the requisite particulars. It is particularly important that applications for Provisional Orders to alter Local Acts should be made at the earliest date practicable. These applications often require much consideration, and the Board are able to give more attention to them in the autumn than is possible during the earlier part of the year. It would prove a material assistance to the Board if all applications for Provisional Orders of this kind were sent in before the 15th of October."

Applications for Provisional Orders to put in force the Compulsory Powers of the Lands Clauses Consolidation Acts.

1. The application must be made by a petition under the seal of the Sanitary Authority, containing the particulars required by Section 176 (3) of the Public Health Act, 1875. The lands proposed to be purchased should be specified in a schedule to the petition, which should correspond in all respects with the book of reference mentioned in instruction 3.

2. The petition must be presented not later than the 15th December, if the advertisements of the proposal were published in September or October, and not later than the 31st of December, if they were published in November.

3. The petition should be accompanied by a plan of the proposed undertaking, by a book of reference in duplicate, and by a statutory declaration showing that the requirements of Section 176 of the Public Health Act, with respect to advertisements and notices, have been duly complied with. The declaration must be stamped with a half-crown stamp, and copies of the newspapers containing the advertisements, and also of the form of notice, should be annexed to it as exhibits. It should specify the manner in which the notices were served upon the owners, lessees, and occupiers, and, so far as relates to these notices, it should be made by the persons who served them. The service must be effected strictly in accordance with one of the modes prescribed by Section 267 of the Act. The plan should be coloured so as to distinguish the land proposed to be actually purchased, and the several properties should be numbered so as to correspond with the schedule to the petition and the book of reference.

Where it is only intended to carry sewers or water mains through lands, such lands should not be included in the petition, as the Sanitary Authority are empowered by Sections 16 and 54 of the Public Health Act to carry sewers or mains through lands without purchasing the lands.

4. The Standing Orders of both Houses of Parliament require that, *at the same time* as the plan of the undertaking and the book of reference are deposited with the Board, duplicates thereof shall be deposited with the Clerk of the Parliaments and at the Private Bill Office, unless the deposit with the Board is made after the prorogation of Parliament, and before the 30th of November, in which case the deposit with the Clerk of the Parliaments, and at the Private Bill Office, must be made on the day last mentioned.

In order that compliance with these requirements may be proved before the Examiners of Standing Orders, the Board should, immediately after the deposits have been made, be furnished with an affidavit, stamped with a half-crown stamp, and sworn before a Justice of the Peace or a Commissioner for taking affidavits, by the person by whom the deposits have been made.

5. The Standing Orders of both Houses of Parliament also require that, in any case where it is proposed by Provisional Order to authorise the compulsory taking, in any urban sanitary district, or in any parish or part of a parish in a rural sanitary district, of ten or more houses occupied, either wholly or partially, by persons belonging to the labouring class as tenants or lodgers, the Sanitary Authority shall deposit with the Board, and also with the Clerk of the Parliaments and at the Private Bill Office, on or before the 31st day of December, a statement of the number, description, and situation of such houses, and of the number, so far as can be

ascertained, of the persons residing in such houses, and a copy of so much of the plan (if any) as relates thereto.

For the purpose of proving compliance with these requirements, an affidavit should be furnished to the Board, as in the case of Instruction 4, and if ten or more of such houses are not to be taken, this should be stated in the affidavit.

6. The Board have been advised that two or more Sanitary Authorities cannot jointly petition for a Provisional Order to enable them to put in force the compulsory powers of the Lands Clauses Consolidation Acts. Either each Sanitary Authority must present a separate petition in respect of the particular lands which they require, or else the several Sanitary Authorities must combine under Section 285 of the Public Health Act, 1875, for the purpose of carrying the proposed scheme into execution, and a petition must be presented by one of them with regard to all the land required. If this course is taken, an agreement under the section should be entered into before application is made for the Provisional Order.

Applications for Provisional Orders to alter the Areas of Sanitary Districts.

7. The application should be made by a resolution of the Sanitary Authority, a copy of which should be forwarded to the Board.

8. The application must be made not later than the 15th of December, and it is very desirable it should be made before.

9. The application should be accompanied by (*a*) a statement giving the names of the Sanitary Authorities whose districts are affected by the proposal, and the grounds upon which the application is made; and (*b*) a map showing the present and proposed boundaries of the Urban Sanitary Districts affected. Where part of a rural sanitary district is concerned, the name of each contributory place affected should be given. The map should, where practicable, be an Ordnance map, on the scale of six inches to a mile. The Urban Sanitary Districts affected, and the areas to be added thereto, or taken therefrom, should, as far as possible, be distinguished by separate colours, with well-defined verge lines so drawn as to show clearly whether the boundary takes the centre or side of any street, river, railway, or fence shown on the map. In the case of a Rural Sanitary District the area of each contributory place affected should be clearly shown.

10. Where it is desired that the area of a Sanitary District should be altered and there is a Local Act in force, relating to the same subject matters as the Public Health Act, application should be made for an alteration of the Local Act at the same time that the application is sent in for an alteration of the Sanitary District, if it is wished that the area to which the Local Act applies should be modified, and instructions 11 and 13 should be complied with.

Applications for Provisional Orders to repeal, alter, or amend Local Acts.

11. The application should be made by a resolution of the Sanitary Authority, asking the Board in general terms to repeal, alter, or amend the Local Act, wholly or partially, as the case may require. A copy of the resolution should be forwarded to the Board.

12. The application must be made not later than the 15th of December, and it is very desirable that it should be sent in before the 15th of October.

13. The Application should be accompanied by a copy of the Local Act, and by a statement showing the particular sections which it is proposed should be repealed, altered, or amended, and the precise alterations desired, and in the event of the Local Act having been previously altered by Provisional Order, a reference to such Order should be given. The statement should also show the grounds upon which the application is made.

14. Where the effect of the proposed repeal or alteration of the Local Act will be to extend or diminish the area of a sanitary district, the particulars referred to in Instruction 9 should also be furnished.

N.B.—It is particularly requested that all petitions, statutory declarations, and other such documents may be written on foolscap paper of the usual size.

HUGH OWEN, Secretary.

Local Government Board, Whitehall,
August 25th, 1885.

Bexhill-on-Sea.—The Local Board having applied for borrowing powers to carry out a main drainage scheme, Major Tulloch, R.E., of the Local Government Board, held an inquiry on Wednesday, the 26th ult., at the surveyor's office. Mr. H. B. Nichols (of the firm of Messrs. Nichols & Sons, Birmingham, the engineers appointed to carry out the works) attended and explained the details of the scheme, and Major Tulloch, accompanied by the chairman (Col. Lane), the surveyor, and several members of the Board, afterwards inspected the lines of the proposed scheme. It is expected that the works will be proceeded with at once, at a cost (including compensation) of not less than 7,500*l.*, Major Tulloch having expressed himself favourable to the scheme proposed.

THE CAMBRIAN ARCHÆOLOGICAL ASSOCIATION AT NEWPORT, MONMOUTHSHIRE.*

CONTINUING our account of this Congress, we have to record that on Wednesday, August 26, a pleasant drive brought the members to Caerleon, where they were met by Mr. Mitchell, who took them over the church, in which there was not much to be seen worthy of notice. They then went to the Museum, in which there is a priceless treasure of Roman relics found in Caerleon and the neighbourhood. This collection, containing all articles in daily use among the Roman occupants, from the child's toy to the veteran's tombstone, includes nothing that would lead us to believe that Christianity was the faith either of the conqueror or the conquered. On one tombstone the palm branch indeed is introduced, but this seems slight evidence. Sacred symbols are conspicuous by their absence. This, however, was not the impression of Dr. Woollit, who kindly took the visitors into his beautiful grounds, and read a paper in which he stated his belief that Joseph of Arimathea and Paul the Apostle of the Gentiles had in days gone by trodden the streets of Caerleon. Without endorsing the romance written by Geoffrey of Monmouth, and dedicated to Robert Consul, Earl of Gloucester (founder of Newport), we may indeed look on Caerleon as one of the most interesting spots in Great Britain. Whether Belimawr established himself here, in the third or fourth century before Christ, we cannot say, probably not; but we do find absolute proof that Caerleon existed in the first century after Christ, and that though a chief town of the Silures (the descendants of the Non-Arian, stone-age folk), it was called by the Cymric name of Caer Wysc, that it was in all probability the home of that Caradawg whom the Britons elected as their commander-in-chief, whom the Romans called Caractacus, and concerning whom every English child has prattled time out of mind. When Caradawg had been demolished, the Romans rebuilt his town, called it Silurian Isca, made it the capital of the second division of Britain, a "colony," and the headquarters of the second or August Legion. Isca was Romanised under Vespasian about B.C. 50, when he commanded the second legion, and it was the head-quarters of that legion, until it removed to Richborough in the year 368. With the departure of the second legion we may suppose actual Roman supremacy faded away from Isca, but it remained a populous, strongly-fortified city, and the English were still a long way off. When it ceased to be called Isca, and took the name of Caerleon, we do not know; when it perished we do not know; but Gerald de Barri, writing in the twelfth century, declared that ruins of "great palaces, a tower of prodigious strength, remarkable hot baths, remnants of temples, and theatres, inclosed within high walls, part of which remain standing," existed in his time. Gerald, it must be admitted, was at times given to drawing the long bow, but in this case he probably did not much over-state his case. And it was round these ruins (so mysterious to the half-savage Celts) that the Arthurian myth entwined itself. The second legion was forgotten: Arthur, Guinevere, Launcelot, Gawain, and the rest took their place. Now with regard to Christianity, that it was established in South Wales during the Roman period is doubtless true, but that it gained any strong hold on the minds of the people seems improbable. At all events, when the Irish and Cumbrian missionaries arrived in the fifth and sixth centuries, the gentle native delighted in providing them with the martyr's fiery crown. Perhaps we may say that Christianity in Caerleon during the latter days of the second legion, had numerous adherents among the upper classes and their imitators, and in all probability it continued to be the creed of a lessening minority until the advent of the missionaries, unless, indeed, the town was destroyed before their time. If, then, there were Christians, in all human probability there were churches. According to Welsh tradition, Dewi ab Sandde (subsequently known as Saint David) was primate of the district which we now call South Wales in the sixth century, he removed the archbishopric from Caerleon to Menevia or St. David's, in Pembrokeshire, because the former was too much frequented by wicked men; perhaps the real reason may have been that these wicked men destroyed the town in his time. According to Geoffrey of Monmouth, an indifferent authority, the old cathedral was dedicated to St. Aaron the Martyr: it has utterly vanished. The present church commemorates a Welsh saint known as Cattwg the Wise, who was contemporary with St. David; if, indeed, the modern church stands on the site of the original structure: the site alone is left.

From Caerleon a lovely drive brought the party to Usk. In the church an impossible Welsh brass led to an animated discussion; from which many of the party escaped into the Priory, an interesting building opened to the Society by the kindness of Gen. Bernard, and then to the castle, a grand old shell. Then the whistle sounded and the visitors were again on the road to Raglan. Search England through and it will be difficult to find a fairer ruin than Raglan Castle. This should be sacred ground to the readers of the *Builder*, for within these walls the earliest steam-engine puffed its baby blast. The tower in which the Marquis of Worcester conducted his experiments still stands, and a number of strange channels still exist in the walls through which he conducted auxiliary water-power from a great tank on the roof. The story goes that when the Roundhead party entered the castle he set a primitive hooter going, and his enemies fled in terror, averring that "The lions were let loose." Through this beautiful ruin the party was conducted by Mr. Somerset, the warden. The old ruin was particularly gay, as a tennis tournament was going on.

From Raglan the party returned by train, and an evening meeting was held, at which the President, Lord Tredegar, took the chair, and several papers were read.

On Thursday morning the windows of heaven were opened, and an inch of rain was projected thence on the town of Newport and its neighbourhood. The rivers of Monmouthshire had been so low that it was rumoured if the drought continued in the course of a week there would not be sufficient water to fill the dock basins, so that this little deluge was grateful to all but archæologists. As may be supposed, some of the faces at the breakfast-table were somewhat prolonged. However, when that meal had been disposed of, and the general secretary's ear-piercing whistle was heard, a little band of members assembled in the porch of the King's Head, equipped with waterproofs and umbrellas.

The first point of attack was Newport Castle, which is about 150 yards from head-quarters. Little more than the shell of this castle remains, and that is used as a brewery. The proprietors thereof met the archæologists, and were conducting them over the castle, when Mr. Mitchell arrived with a paper written by Mr. Octavius Morgan. With the assistance of this paper and a large plan, he gave the party a pretty clear idea of what the structure had originally been. There seems to have been a Welsh fortification on the site of the present castle, known as Castell Newydd, or Newcastle. Then the Normans over-built this with a stone fortress; apparently none of the Norman work is left, though a bit of herring-bone masonry between the western and central towers was deemed by some present to date back to Roman times. The castle passed successively through the hands of De Clares, Le Despensers, Beauchamps, Nevilles, and Herberts. Mr. Mitchell pointed out the remains of a passage which once existed between the outer and inner walls. The chapel was in the central tower, and its very handsome groined roof still remains in a fair state of preservation. The cellar and watergate below were inspected, and notice was drawn to a traditionary passage which was reported to lead to Caerleon. It is curious how frequently the myth of subterranean passages occurs.

The party then returned, and took train for Tintern. By the time we arrived, our party had been considerably recruited from Chepstow and elsewhere.

On arriving in the castle the visitors found that the warden (Mr. Loraine Baldwin), though an invalid, was present to receive them, and had invited Mr. Blashill to explain the details of this extremely beautiful ruin. The rain continued to fall in a sulky dogged fashion.

Mr. Blashill, after some remarks on the order of Cistercians who founded the abbey, said that the existing structure was built by Bigod, of Norfolk, in 1268, and traced the architectural history of the edifice in a masterly fashion

* See p. 306, *ante*.

almost stone by stone, and then exhibited a portion of the original pavement in the chapter-house, which was uncovered last autumn, and which will be again covered with sods to preserve it from the weather.

The Rev. Canon Thomas, chairman of the committee of the Cambrian Archæological Association, returned thanks to Mr. Blashill for his extremely able paper, and in the name of the Association asked permission to publish it in their journal, a request which was readily acceded to by the author.

Mr. Laws, the general secretary, proposed a vote of thanks to Mr. Loraine Baldwin for the kind way he had received the Association, and for his thoughtful care in asking his friend, Mr. Blashill, to explain the many difficulties which occur in the Tintern ruins. Then to lunch, and on to Monmouth by train.

The first object which attracted attention was the Monnow Gate, the last of the four city gates which once existed. This is built on the bridge which spans the river Monnow; it consists of a gateway formerly containing a portcullis, with a staircase on one side. Above there was a guard-room, and on the left-hand side a garderobe; above were some other small apartments. The requirements of the day have led to a widening of the bridge and the formation of a passage for foot traffic on each side: these have been made in a fashion which is most creditable to the town surveyor, for they offer the requisite accommodation to the public, without causing offence to the archæologist. Having examined the churches, in which there was not much to be seen; the visitors proceeded to the Castle, which is now used by the Militia as a barracks, and has few points worthy of attention. The window in which Geoffrey of Monmouth is supposed to have sat while inditing "Historia Britonum" (alas! the date of the window and the work do not agree) was shown us in the almshouse. Then for the station, and back to headquarters at Newport.

In the evening there was a meeting for members only, the secrets of which far be it from us to disclose.

On Friday morning the rain had blown off, and the members assembled at the station in the bright sunshine to proceed to Caerphilly Castle in a special train. Caerphilly, as is well known, is a giant among ruins. It contains no fewer than thirty acres of land within its walls, and, with the doubtful exception of Windsor, was the largest castle in Great Britain. When Caerphilly was in its glory it must have looked like an adaptation from the lacustrine period, for round the castle was a great artificial lake. This and the immense walls rendered the castle practically impregnable, and it is to be feared that the inhabitants, relying on the strength of their stronghold, robbed their Welsh neighbours cruelly. Hence arose the popular proverb: "It's gone to Caerphilly." This was equivalent to saying that a thing was irrevocably lost. How Despencer defended Caerphilly, in which was King Edward II., how they fled and were captured, is it not to be found in the annals of English history?

The Rev. J. W. Evans, of St. Mellon's, by way of explaining the topography of Caerphilly Castle, read an extract from Mr. G. T. Clark's admirable work on Mediæval Military Architecture, the entrance-gate tower approached by a double drawbridge. The platform, the curtain, the inner moat, the lake, the redoubt (an earthen mound not unlike that at Caerleon), and the great hall, were all described from Mr. Clark's work.

The keen autumnal wind whistling through the ruins and across the short sward began to turn the thoughts of the party to luncheon, so the signal for retreat on Tredegar Park was most welcome. One member managed to miss the train, but he was observed running in the distance, and the special pulled up and awaited his arrival. When we arrived at Bassaleg we found our noble President, who, through an unfortunate mistake, had missed us at Caerphilly. The ladies of the party were accommodated in a break, Lord Tredegar taking others in his carriage, while the gentlemen found their way on foot to the old home of the Morgans.

Here the host had provided luncheon for the party and afterwards conducted them over the house.

Tredegar is a fine house of Charles II. period, built round an older house. The Mediæval hall is now used as the servants' hall.

Having inspected the mansion, Lord Tredegar led the way across the park to the great Gaer or camp. This is evidently the remains of a huge neolithic fortress; in it flint implements have been found. From its ramparts a lovely view lies before the visitor, on the one side Severn Sea with the opposite coast of Somerset, on the other the Welsh Hills stretching away in endless succession.

From the Gaer to St. Woolos's Church, in Newport, was but a short walk. Mr. Morgan met the party at this point and went carefully through the history of the church, which, as so frequently happens, may be read from its alterations. What will future ages make of our restored churches?

In the evening the closing meeting was held, the President in the chair. As is usual on such occasions, votes of thanks were passed to the many kind friends who had in different ways made the time so pleasant for the visitors. Never did entertainers better deserve thanks, for the President, the Local Committee, and the Local Secretary had done their work right well, and the meeting was with one consent voted a success.

Chester was chosen as the scene of next year's campaign.

ASSOCIATION OF MUNICIPAL AND SANITARY ENGINEERS.

A MEETING of the Lancashire and Cheshire district was held at Blackburn on the 28th ult. The president, Mr. R. Vawser, M. Inst. C.E., of Manchester, presided, and there was a fair attendance of members. Mr. J. B. McCallum, Borough Engineer, read a paper, giving a description of the municipal and sanitary work of Blackburn. The population has doubled since 1861. The death-rate in 1884 was 23·4 per 1,000. The general district rate is 3s. 2d., the borough rate 1s. 4d., the poor rate 9½d., and the county rate 4d. in the pound. One feature of the sewerage is that a portion of the area added to the borough in 1876 is too low for the drainage to flow by gravitation into the existing main outfall sewer. This difficulty was met by fixing a pair of hydraulic engines in a chamber under the roadway, worked by a 6-in. water-main. These pumps are capable of lifting together a million gallons per day to the height of 20 ft. No attention is required, except oiling, and the estimated cost for water is 20*l.* per annum. The sewage is disposed of by irrigation, and the land was acquired by compulsory purchase, and the total cost has been 114,000*l.* One farm entails a cost of about 600*l.*, and the income from Samlesbury Farm is about 900*l.* per annum, or a little more than 1 per cent. on the 69,000*l.* expended. The tub system resulted in the abolition of 5,000 offensive middens; but in all new premises water-closets are made compulsory. The waterworks were purchased by the Corporation in 1875, at a cost of nearly 342,000*l.*, but 337,660*l.* have since been spent on extensions. The consumption is 2¼ to 3 million gallons per day, and there is a considerable surplus. The gasworks were purchased by the Corporation in 1877. The present capital is 602,000*l.*, and the production 408,000,000 cubic feet per annum. The sewage has to be conveyed to Samlesbury sewage farm across two ravines. In crossing the first the sewer, which is constructed of wrought-iron, takes a leap down of from 80 ft. to 90 ft. in a shaft. From the bottom of this shaft a tunnel has been driven out of the hill side at a height of about 40 ft. above the river. A wrought-iron tube bridge, of three spans of 40 ft. each, crosses the ravine (the sewage being at this point under very great pressure) and the conduit is continued under pressure for a considerable distance up the hill, the summit of which is tunnelled through. The next ravine is crossed by an embankment containing some 13,000 cubic yards of earth, and the two next by means of wrought-iron tubes, each of 40 ft. span, the stream passing underneath these syphons. The Corporation farm the Higher Park farm themselves, but the Samlesbury farms are let to tenants, who have the privilege of using just as much sewage as they please. Mr. McCallum also described the various public buildings of the borough, and gave details of the working of the highways department.

A discussion followed, in the course of which it was stated that the sewage syphons were kept free by the sewage being first strained, and it was explained that the charges made for constructing private streets were regulated by a private Act. After lunch the various public works described were visited and inspected, and in the evening the members dined together at the White Bull Hotel.

OBITUARY.

Mr. Thomas Thornycroft.—The death is announced of Mr. Thomas Thornycroft, sculptor, of Moreton House, Melbury-road, Kensington. He died on the 30th ult. at Brenchley, in Kent, at the residence of his son-in-law, after a relapse from rheumatic fever.

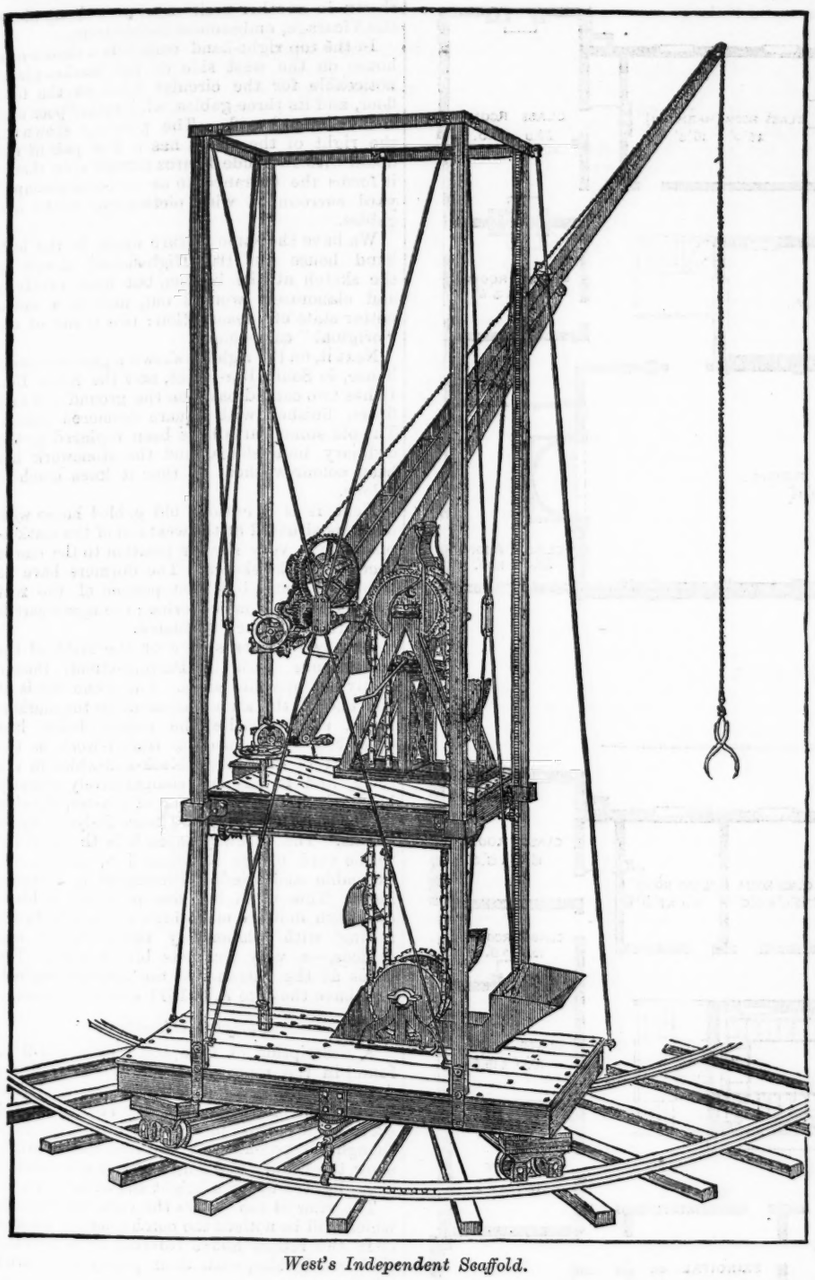
Herr Anton Widmann.—German papers announce with expressions of deep regret the death of Anton Widmann, of cholera, at Granada, after nine hours' illness. He was only in his twenty-ninth year, but had given promise of a most brilliant future in the higher departments of architecture. He was an excellent draughtsman, possessing an immense fund of information even on subjects remotely connected with his profession, and, at the same time, he had a great faculty of original design and a singularly ripe judgment. He had just completed a great work on the "Architecture of the Renaissance in Tuscany," having spent some years in Italy studying the subject in all its details. His last eighteen months were passed in Spain, also in architectural studies, which, no doubt, would in time have borne good fruit.—*Times*, August 28.

WEST'S INDEPENDENT SCAFFOLD.

WEST'S independent portable travelling machine-scaffold is intended to supersede the present system of scaffolding. The inventor designed it mainly with the idea of carrying out concrete work, but it aims at being useful on any structure that requires an independent scaffold, as well as on those where ordinary scaffolding is employed. It may be used wherever a light tramway of contractor's rails can be laid, which in crowded thoroughfares would of necessity be upon a staging erected over the footway. These rails are laid upon light sleepers, the outer ends of which are fastened down to the earth by means of corkscrew-shaped iron (or they may be staked or ballasted down). At the quoins of the structure the curves of the rails are made very quick, and a guide-plate is fixed concentric with, and close to, the inner rail. Upon two bogie frames running upon these rails is carried an underframe, to which is secured four (or any suitable number of) vertical posts, each of which has a rack attached to one of its faces, and which are securely braced by steel rods to resist racking-strains. The scaffold itself consists of a climbing platform made to travel up and down these posts,—a suitable worm-gearing actuated by a wheel on the upper side of the scaffold, giving motion to the pinions gearing into the vertical racks, and thereby causing the platform to ascend or descend, or to become secured at any height. A rail-grip (made to act at the curves as well as on the straight portions of the rail by being attached to a radial arm) fixed to the underframe assists the stability of the scaffold in cases where required, but the gauge of the rails is altered to render the scaffold more or less stable according to its height, and, to further secure it, the ends of the underframe outside the posts may also be ballasted down by means of bags of earth, &c.

Combined with the same machine, and travelling up and down one of the same posts used for the scaffold, is an improved patent crane. Its action depends upon the proposition in geometry, that "if the length of the base of a triangle be altered, its angles, and therefore its altitude, are altered." A portion of the vertical post up and down which the crane climbs, forms the base of a triangle, and a portion of the jib, together with the stay, form the remaining two sides. Hence, by causing the foot of one or the other to travel upwards, by means of the worm-gearing provided for that purpose, the upper end of the jib is either elevated or depressed.

The concrete elevator, which is also combined with the scaffold, consists of a series of buckets carried upon two parallel endless chains passing over two pairs of wheels. On the under-frame is fixed a hopper, into which is



West's Independent Scaffold.

thrown, either by hand or from a concrete-mixer running upon the same rails as the machine, the material to be hoisted, and from which it gravitates into a narrow channel, through which pass the buckets attached to the chain, with a shovel-like action. A motor being applied to one pair of wheels, the buckets thus automatically fill themselves, and on arriving at the top are made to jar themselves, and to tip tneir contents automatically into a hopper, by means of a small pinion (friction gearing or a lever may also be used) keyed to the shaft, by which they are attached to the endless chain, becoming engaged in a small radial rack fixed for that purpose. From the upper hopper the material is taken away to the required destination by means of a worm working in a tube or trough, which may be lengthened or shortened to suit varying distances. For varying heights, extra length of chain and buckets are inserted, and secured by a bolt passed through each end link, and secured by a nut. The elevator, as well as being used for raising any other material besides concrete, may also be employed as a chain pump or noria.

As much of this combined machine as possible has been made of steel in order to ensure lightness.

Among the many advantages claimed for this system of scaffolding we may mention (1) its extreme lightness compared with that ordinarily used, and, therefore, the great saving to be effected in the cost of cartage; (2) its portability, each part having been specially designed to be taken to pieces, and to be packed into as small a compass as possible; (3) its cheapness and saving in the unnecessary use of material compared with ordinary scaffolding, as this scaffold exists only at the point of operation, and only during the time that it is actually required there; (4) its non-interference with the work, as no putlog or bolt-holes, and such like, are required, the scaffold being entirely independent of the work, as well as self-supporting; (5) the great saving in the labour usually expended in erecting and removing scaffolding; and (6) that it is a necessary auxiliary to overcome the obstacles in concrete construction.

The inventor and patentee is Mr. Frank West; and a model of the machine to one-eighth scale is shown at Stand 278, Group III., in the South Gallery (North Court) of the Inventions Exhibition.

Fire at a Timber-Yard. — Early on Saturday last a fire broke out at the extensive timber-yard of Mr. T. Forman, 148, Kennington-road. The yard occupies an area of about three-quarters of an acre, and in it were stored twelve stacks of valuable timber. The fire attacked nearly all the stacks, three of which were almost completely destroyed, while the others were very severely damaged. We are asked to state that Mr. Forman has made arrangements to carry on his business as usual.

Illustrations.

THE SHAKSPEARE MEMORIAL.

OUR illustration represents the Shakspeare Memorial Theatre at Stratford-on-Avon, which has been for some little time completed,—at least, so far as the external architecture is concerned,—excepting the statuary and bas-relief carvings.

We also give a view of the entrance-hall and principal staircase.

The building facing the road comprises the library and picture-galleries. The semicircular building is the end of the auditorium, which building is connected by a covered bridge with the main or library entrance. The theatre is, however, complete in itself, with very efficient entrances and exits. This portion of the building, which has been completed some few years, was carried out by Mr. W. H. Lascelles, Bunhill-row, from the designs of the late firm of Dodgshun & Unsworth. We commented on the design at the time of the competition some years ago, and drew attention to the manner in which the curve of the auditorium was shown as a portion of the external design,—a piece of architectural truthfulness unfortunately very unusual in theatre designing.

In the tower are large tanks, automatically supplied with water from the river Avon, for protection in case of fire. From the lantern in the roof most extensive views may be enjoyed of the surrounding country and picturesque town. The tower was built by Messrs. W. H. Lascelles & Co., from designs by Mr. W. F. Unsworth.

Some special interest has attached to the theatre and its surroundings during the present week, owing to the presence of Miss Anderson there as an interpreter of Shakspeare, and the concourse of a considerable circle of visitors from London and elsewhere.

ST. MICHAEL'S CHURCH, FARNLEY.

THE site occupied by this building has carried a church for many centuries, although all traces of the first erection have been lost. In excavating for the foundations of the present structure some fifteenth-century remains were unearthed, portions, probably, of the second church erected. The third one, which stood on the ground prior to the commencement of the erection of the present building, was an eighteenth-century church of no special interest, and which had become inadequate in area for the accommodation of the parishioners.

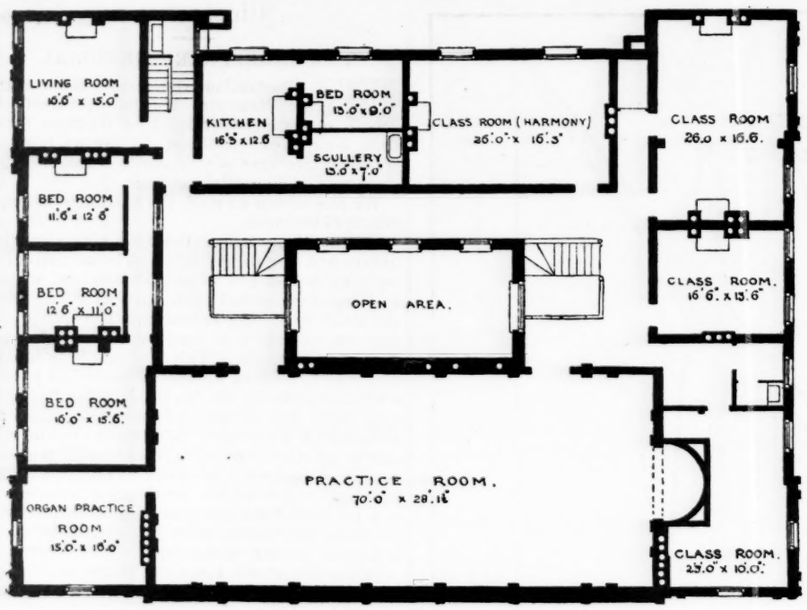
The parish is a poor one, so as to necessitate the use of economy in the erection of the new church, which has, consequently, been designed in a simple manner, but with the use of sound durable materials. The interior, shown in the view, is lined entirely with buff terra cotta, the dressings being of red stone, and the woodwork of unvarnished pitch pine. The intention has been to employ only such material as would be of a permanent character, and would not entail constant expense and repairs.

The architects for the building are Messrs. Chorley & Connon, of Leeds.

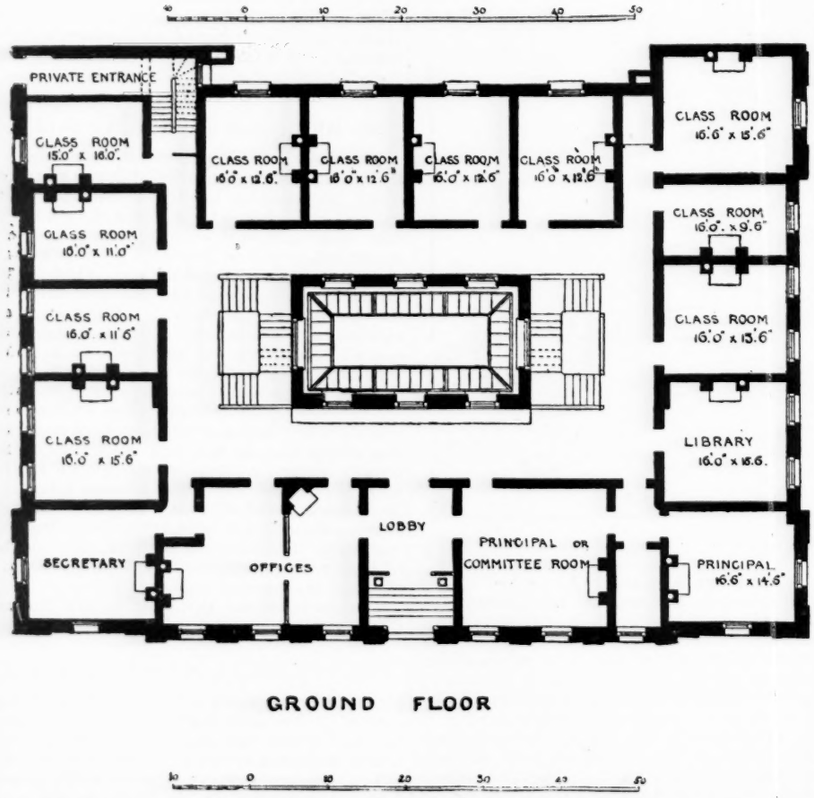
THE GUILDHALL SCHOOL OF MUSIC.

OF this important building, now being erected at the cost of the Corporation of London on the Victoria Embankment, we give the elevation and plans of two of the principal floors.

The site comprises an area of 8,000 square feet. It is situated on the Embankment, near Tudor-street, Blackfriars, and has return frontages to new roads recently formed on that land. The building, of which Mr. Horace Jones (past-President of the Royal Institute of British Architects) is the architect, will consist of four floors, and will contain forty-two class-rooms in all. In the basement there will be a common room for the professors, two refreshment-rooms, two cloak-rooms, stores, &c. The ground-floor will be approached by a spacious vestibule and lobby, on the right of which will be two rooms for the principal or committee, and a library, while on the left will be the secretary's offices, all the other rooms being class-rooms. The rooms on the first floor, except one which is to be devoted to the Lady Superintendent, are all for class-rooms. The second floor will contain a practice-room, 70 ft. by 28 ft., designed somewhat on the lines of the large concert-hall of the Surrey Gardens, now removed, and of which Mr. Horace Jones was also the architect. There will also be on


LIVING ROOM 16'6" x 15'0"
KITCHEN 16'5" x 12'6"
BED ROOM 13'0" x 9'0"
SCULLERY 13'0" x 7'0"
CLASS ROOM (HARMONY) 26'0" x 16'3"
CLASS ROOM 26.0 x 16.6.
BED ROOM 11'6" x 12'6"
BED ROOM 12'6" x 11'0"
OPEN AREA.
CLASS ROOM. 16'6" x 13'6"
BED ROOM 10'0" x 15'6"
PRACTICE ROOM. 70'0" x 28'1"
ORGAN PRACTICE ROOM 15'0" x 16'0"
CLASS ROOM. 25'0" x 10'0"

SECOND FLOOR.


40 0 10 20 30 40 50
PRIVATE ENTRANCE
CLASS ROOM 15'0" x 16'0"
CLASS ROOM 16'0" x 12'6"
CLASS ROOM 16'0" x 12'6"
CLASS ROOM 16'0" x 12'6"
CLASS ROOM 16'0" x 12'6"
CLASS ROOM 16'6" x 15'6"
GLASS ROOM 16'0" x 11'0"
CLASS ROOM 16'0" x 9'6"
CLASS ROOM 16'0" x 11'6"
CLASS ROOM 16'0" x 13'6"
CLASS ROOM 16'0" x 15'6"
LIBRARY 16'0" x 16'6"
LOBBY
SECRETARY
OFFICES
PRINCIPAL OR COMMITTEE ROOM
PRINCIPAL 16'6" x 14'6"

GROUND FLOOR

The Guildhall School of Music.—Plans.

this floor two large class-rooms for harmony classes, an organ practice-room, and secretary's residence. The building is to be constructed on a granite plinth. Two staircases are to be provided, one for ladies and the other for gentlemen. Each class-room is to have separate ventilating apparatus, while double doors and double sashes are also to be provided so that the corridors may be kept quiet. The estimated cost of the building will, it is stated, be 20,000*l*.

REMINISCENCES OF THE ARCHITECTURAL ASSOCIATION EXCURSION.

WE give this week various sketches, specially prepared, of places visited by the Architectural Association in their recent annual excursion, and will give some further ones in our next. The sketches, we may observe, only represent places actually visited, not those which it may have been supposed the party might, could, or should have visited.

Banbury.

In Banbury there are numberless old houses, most of them of but little value but for their picturesqueness, but there are a few more notable, and perhaps typical, examples which are deserving of more than a general glance at, and some of them have been taken from different quarters of the town, and are grouped together in the illustration, as a kind of general reminiscence of the features of the place.

In the left-hand top corner is a view of the Vicarage, a house with mullioned windows, built of a rich brown-coloured stone, though almost hidden up with creepers; as seen from just above the noted "Banbury Cross," the tower of the church (which for convenience is shown in another position) rises well up above the Vicarage, embosomed in fine trees.

In the top right-hand corner is a sketch of a house on the west side of the market-place, noticeable for the circular bays on the first floor, and its three gables, with rather poor and coarse barge-boards. The gateway shown to the right of the shops has a fine pair of old doors with two rude figures carved upon them; it forms the entrance to an irregularly-shaped yard surrounded with picturesque nooks and gables.

We have the same feature again in the left-hand house (in the High-street) shown in the sketch at the bottom, but more carefully and elaborately worked out, and in a much better state of preservation: this is *one* of the "original" cake-shops.

Next it, on the right, is shown a good old stone house, in South Bar-street, now the Swan Inn. It has two canted bays, on the ground and first floors, finished with square dormered gables. The old stone slates have been replaced by the ordinary blue slates, and the stonework has been colour-washed, so that it loses much in colour.

Next it is a curious old gabled house with dormers situated at the west end of the market-place, in a very similar position to the one it occupies in the sketch. The dormers have no lights in them, but that portion of the roof retains its old stone covering; the upper part is plastered and much mutilated.

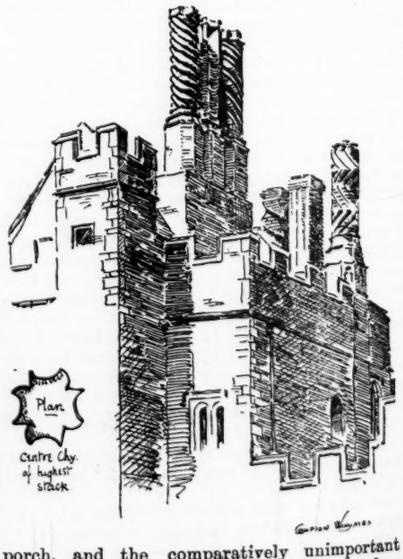
The two houses shown on the right of the picture are both in Parsons-street, though really on opposite sides. The stone one is at the end of the street adjacent to the market-place, and opposite the gabled house last described. The piece of timber-work is the only bit of uncovered black-and-white in the town, and it has but comparatively recently been relieved of its coating of plaster, showing up the timber framing and fleurs-de-lys in upper panels. The gateway beneath is the entrance to the yard of the Reindeer Inn, in which is the gable and window illustrated in a recent issue. This room has fine panelling in black oak, with delicate mouldings, and a rich plaster ceiling with elaborately raised bands and devices,—a very complete bit of work. The gates at the entrance to the yard are original, and have the date A.D. 1571 carved on them.

Compton Winyates.

A description of Compton Winyates will be found in the report of the first portion of the Architectural Association Excursion, published in our issue of August 15. We now give three sketches of this most picturesque building, though no pen-and-ink drawing can possibly show the beauty and gorgeousness of colouring when lighted up by a bright sun at mid-day.

The view at top shows the entrance-front in which will be noticed the porch specially spoken of in the report above referred to, as also the timbered gables, with their pretty little oriel windows.

The quadrangle, of which a sketch is given, is reached by passing directly through the



porch, and the comparatively unimportant door opposite to it leads into the hall; the bay window in the angle is the one said to have been brought from the destroyed castle of Ful-

INT. PHOTO. SPRAGUE & Co. LONDON.

THE SHAKSPEARE MEMORIAL THEATRE, STRATFORD-ON-AVON.

MR. W. F. UNSWORTH, A.R.I.B.A., ARCHITECT.

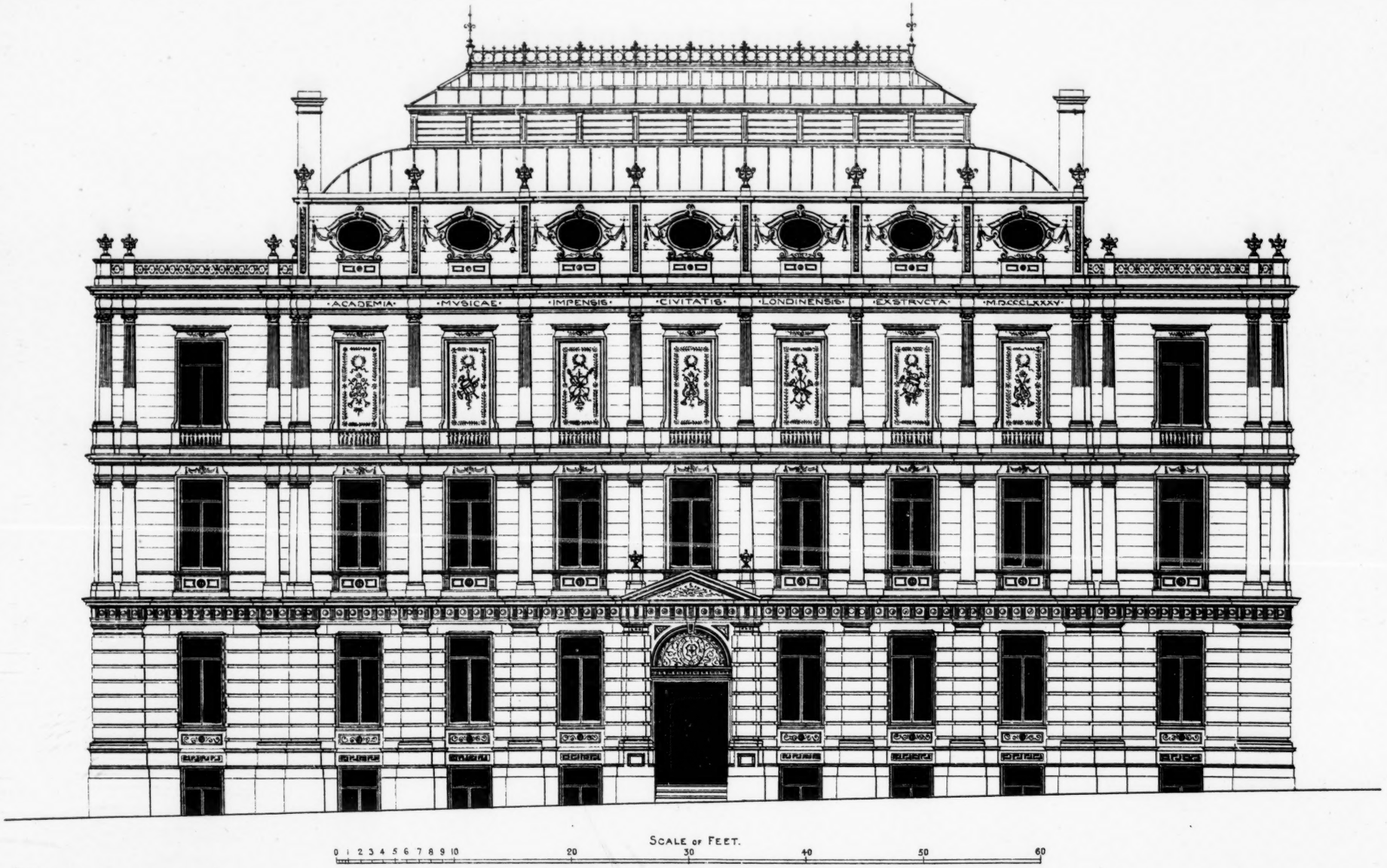
EXTERIOR VIEW.

INK-PHOTO. SPRAGUE & Co. LONDON.

THE SHAKSPEARE MEMORIAL THEATRE, STRATFORD-ON-AVON.

MR. W. F. UNSWORTH, A.R.I.B.A., ARCHITECT.

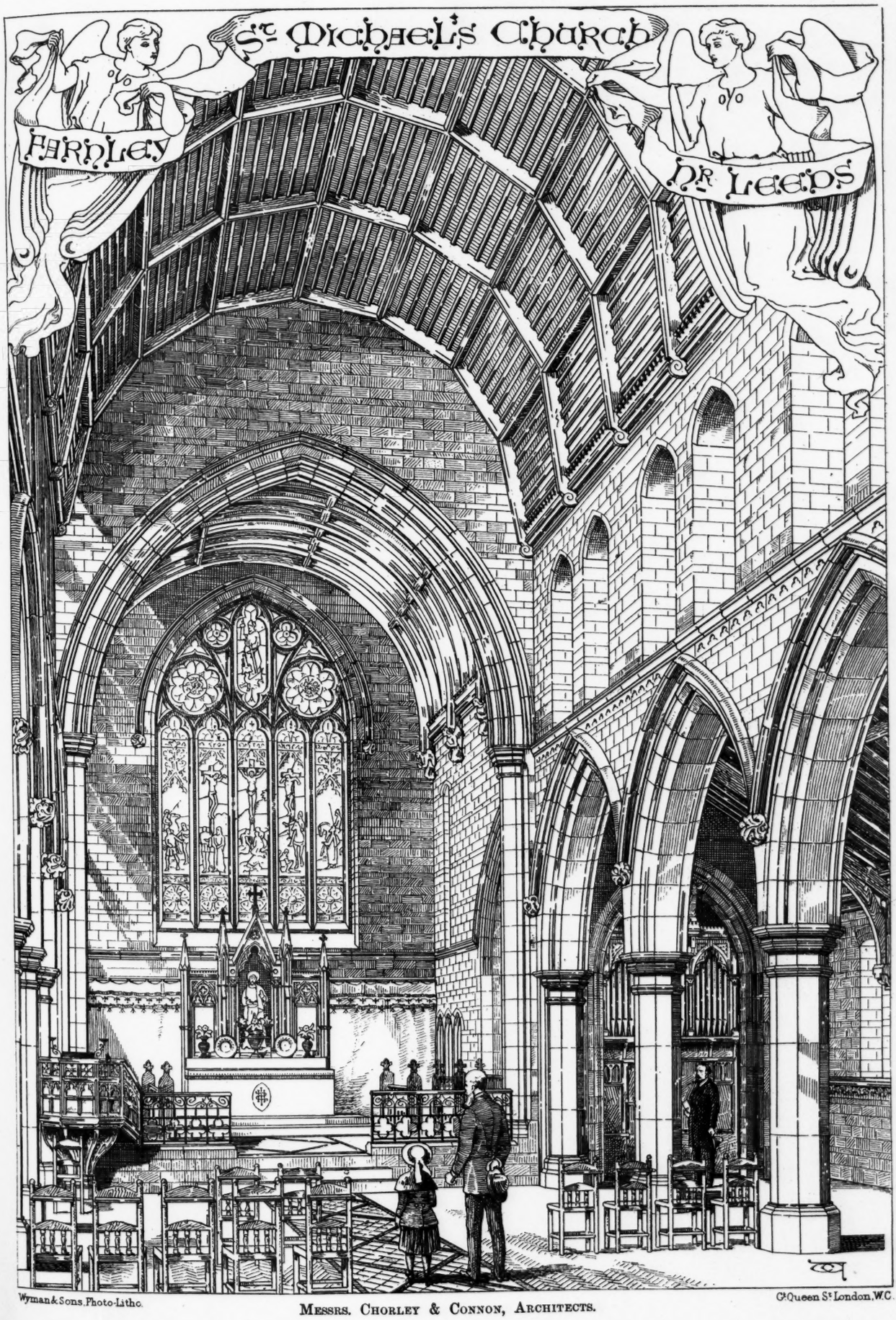
ENTRANCE HALL AND STAIRCASE.



Wyman & Sons, Photo-Litho.

Ct Queen St London, W.C.

THE GUILDHALL SCHOOL OF MUSIC, VICTORIA EMBANKMENT.—MR. HORACE JONES, P.P.R.I.B.A., ARCHITECT.



Wyman & Sons, Photo-Litho. 74 Queen St London, W.C.

MESSRS. CHORLEY & CONNON, ARCHITECTS.

Old Parsonage House, Deddington. Thos Garratt. delt.

Manwell Castle. Thos Garratt. delt.

Shutford Manor House. S. J. Clarkson. delt.

Kings Sutton Manor House. Thos Garratt. delt.

Kings Sutton Manor House. J. Bilson. delt.

PHOTO-LITHO. SPRAGUE & Co. LONDON

REMINISCENCES OF THE ARCHITECTURAL ASSOCIATION,

AUGUST, 1885.

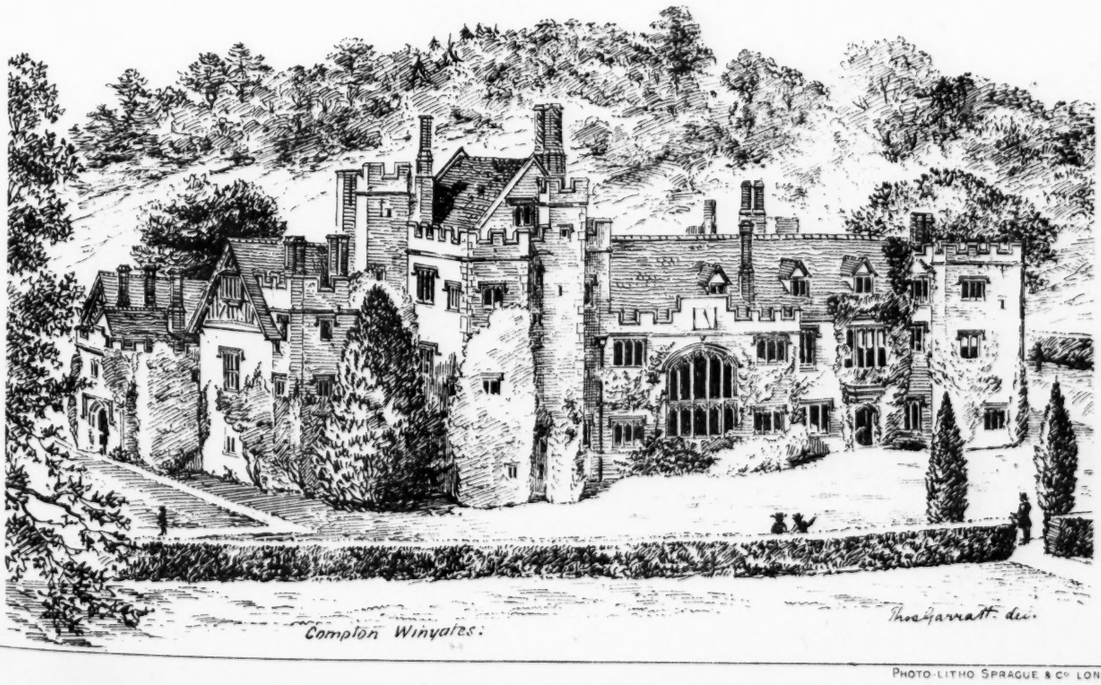


PHOTO-LITHO SPRAGUE & Co LONDON

REMINISCENCES OF THE ARCHITECTURAL ASSOCIATION,

AUGUST, 1885.

Sketches in

REMINISCENCES OF THE ARCHITECT

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n Banbury.

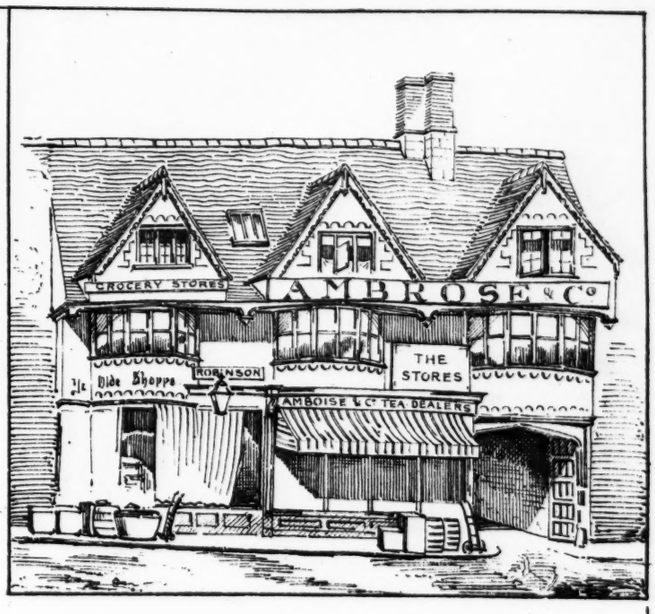

PHOTO-LITHO SPRAGUE & Co LONDON

brooke: whether or no this be true, it is the principal feature of the quadrangle, and fits into its position with admirable effect.

The general view at bottom was taken from about half-way down the hill, approaching the mansion by a footpath from the road.

The sketch on page 322 of some of the chimneys is reproduced from a pen sketch in Mr. J. A. Gotch's sketch-book.

Deddington Parsonage House.

There are several examples of fine old houses existing in Deddington, but the "Parsonage House" or "Manor Farm House," or "Pilgrim's House," whichever it be called, is the most noticeable for its balustraded tower. It is situated near the church and was built in 1654. Inside it contains a great deal of interesting woodwork in panelling chimney-pieces, and a very fine and unusual treatment of staircase, sketches of which we hope to give in a future number.

Hanwell Castle.

All that remains of the once famous Castle of Hanwell, the seat of the Cope family, is shown in the sketch of the brick tower, with octagonal angle turrets. The string-courses, windows, quoins, and plinths are of stone, but beyond that there is no detail, though it is bold and effective in mass and delightful in colour. The sketch shows it one story short, as it is built in a hollow and nearly surrounded by farm buildings, being itself now used as a farm-house.

Shutford Manor House.

The manor-house at Shutford stands high up above and beyond the church, its principal front facing south, the long range of low stone mullioned windows, both on the ground and upper floors, giving it a decided air of comfort. It has also a Jacobean porch, of considerable merit, on this front. The north-east view shown in the sketch is of a much less dignified character, but is interesting for its quaint grouping, the staircase block adding considerably to this effect. The six-light window on the ground-floor, as seen in the sketch at the end of the building, lights a room in which there is some well-moulded oak panelling, with enriched frieze and cornice, and the original stone chimneypiece.

King's Sutton is a very good example of an old English manor-house, without any "special" features, and owing much of its picturesque effect, no doubt, to its wealth of creepers and abundance of foliage, but a sight of its simple treatment and restfulness affords a vast amount of pleasure to those who do not appreciate the elaborate attempts at "singularity" in some modern buildings; apparently it suits well nineteenth-century requirements, it is evidently well cared for and valued by the present inmates. Most of the stone detail may be found in any house of the same type in the neighbourhood and adjoining counties, but the woodwork of the staircase and other interior details are somewhat unusual.

[The sketches in this number, and others that will be given in the following number, are mostly drawn for this journal by Mr. T. Garratt from sketches made *in situ* by himself and by other members who have kindly lent their sketch-books, among whom we are indebted to Messrs. S. F. Clarkson, J. Johnson, J. Bilson, and J. A. Gotch.]

MEETING OF ASSOCIATES, R.I.B.A.

SIR,—Will you grant me a small space in your columns to call the attention of all Associates of the Royal Institute of British Architects to the notice,—headed "General Meeting of Associates in October,"—which appears in the last number of the "Proceedings," on p. 242.

I shall be much obliged if all communications relating to the business of that meeting be sent to me, at 8, Delahay-street, Westminster, S.W., before the 24th inst., on which date the Associates' Committee holds its next meeting.

G. RICHARDS JULIAN,
Hon. Sec. Associates' Committee.

The Students' Home, Kensington Gore. We are informed that over twenty of Banner's ventilators are to be used in connexion with Sir Frederick Bramwell's scheme for the ventilation of the Students' Home, Kensington Gore.

"EXPERIMENTAL BUILDING: ARCACHON VILLA, MOOR ALLERTON, NEAR LEEDS."

SIR,—Seven years ago (October 19th, 1878) you did me the honour to illustrate and describe in your valuable journal the above villa, under the title here repeated. After the appearance of the article in question, it is needless to add the novelties introduced received very severe criticism, and many of the remarks made by professionals and others were anything but of a flattering character. Everything, of course, was wrong. "The position of the doors was a very grave blunder,—would cause all the chimneys to smoke, and make the rooms so draughty that no one could comfortably exist in them; the ventilation was an absurdity, and would require continual attention, and could only be opened and shut by either going outside the house, or keeping a pair of steps handy inside; the drainage system was another blunder, which I should soon find out to my cost. The construction of the earth-closet was also a mistake, and could never answer satisfactorily, and would eventually become a nuisance; whilst the storage reservoir of rain water under the house brought on my devoted head a torrent of abuse. Of all possible things, only a very belated individual would construct such a tank: the water would decompose, the house would be made damp, the germs would breed in the water, the exhalations from it would spread disease in the house, and not only should I have a heavy doctor's bill to pay for my 'fad,' but should sow disease in the neighbourhood, and thus become a public nuisance." On these grounds it was said the authorities ought to cause it to be done away with. Fortunately, however, being out of the borough, they had not the power to abolish it.

Now, after seven years' trial, I beg to submit to you the results arrived at, and if you think the remarks interesting to your readers, you are at liberty to publish the same.

The facts I have demonstrated practically are, in my opinion, of vital importance in all country districts, especially where water supply and a proper drainage system do not exist. Of course, in large towns, with all the necessary adjuncts of civilisation, the experiments I have made would not be of much use.

In view, however, of the ravages of cholera, and where drainage is not extensively in use, these experiments become very interesting, and I venture to say, of some practical use. If I said they could not be improved upon I should be stupidly egotistical, but when I say they have answered every purpose for which they were made, then I think I have a right to let you know, from having laid before the public in your journal what was thought at the time a series of stupid mistakes, or, as one person put it, "a conglomeration of fads."

Results arrived at:—1. The position of doors does not cause draughts, but enables more space in the room to be utilised with comfort than the usual plan, which often causes an unpleasant draught from door to fireplace when opened, especially in cold weather, and when the passages are not also heated.

The ventilators are self-regulating, and never need the slightest attention, but have been wide open summer and winter alike for seven years and act so well that although the current of air coming in in large or small quantities, as required (self-regulating), can be tested by applying a flame of candle, &c., yet when the volume of fresh air is largest no draught can be detected in the body of the room a foot below the ceiling. The earth-closet has been fairly tested. To do this I determined it should not be emptied until the pit was full, this took three years, and was in every way a most satisfactory experiment; then the sump, which I believe was not described, has only just been emptied, has worked for seven years without either nuisance or offence. In proof of which: having let the house, the new tenant was anxious and nervous on this point and requested all to be made right before I left, so I startled him by saying it had not been emptied for seven years (household of 13 persons), but that in walking about the grounds I would take him close past it three times and he should try to find out where it was. He did his best to discover it but was bound to admit that it did not indicate its presence. Such things often do so very forcibly.

It consists of two well-cemented tanks, 5 ft. diameter and 5 ft. deep, so constructed that there is very little room for gas to accumulate, and what does form passes downwards through a pipe by gravitation. There is no ventilating shaft, and those who make one commit a grave error. Carbonic acid gas does not rise. All that is needed is to hermetically seal the tank by lime or cement and keep a foot or 18 in. of earth on the top of it; the downcast pipe then takes the carbonic acid gas away in small quantities as it forms and no mischief or nuisance is caused by accumulation. This is not theory, but a practical demonstration. The tank would have worked well for another three years; but seven years is a reasonable time and I should not advise longer.

Now for that last abomination, the rain water-tank. It has never yet been emptied, but is so constructed that it can can be at any time. The water is sweet, bright, and clear, and astonishes every one that sees it.

Doctors' bills for the last seven years (except on occasions of increase of population) have been unknown; unfortunately, in previous years they came in as regularly as the taxes.

I should not have troubled you with this, but have let the house and am going to Australia; therefore I thought I would just let you know how the experiment succeeded.

If you have any agent in these parts who would like to see for your own satisfaction, I could, this next week, let him look round; but I give up possession on the 1st of September, so could not guarantee after that date to do so. JOHN SMITH.

PROVINCIAL NEWS.

Workington.—The foundation-stone of the new infirmary buildings, to be erected on a site given by Mr. H. F. Curwen, of Workington Hall, has just been laid by Mr. Edward D'Arcy Curwen, in the presence of about 15,000 persons. The plan is arranged on the pavilion principle, and, when completed, will consist of a central administrative block, two stories in height; the kitchens in the rear approached by a covered way; and the male and female wings respectively on either side. The buildings are to be carried out in local stone; and the sanitary arrangements are all of the highest and most complete character. The whole of the works have been let to Messrs. Gibson & Kinnear, of Workington. The architect is Mr. George Dale Oliver, of Carlisle, whose plans were selected in open competition.

Cranleigh (Surrey).—The Hambledon (Surrey) Union Sanitary Authority have instructed Mr. Ellice-Clark to prepare a scheme of drainage for Cranleigh, in which place is situated the large Surrey County School.

Hersham (Surrey).—The memorial-stone of the Village Hall and Working Men's Club at Hersham has just been laid. The building, which is being erected under the auspices of a company formed for the purpose, is designed to hold about 300 persons, and will be fitted with a stage and ante-rooms, &c., so that there will be facilities for dramatic representations as well as for other entertainments. Messrs. W. & A. Brown, of Oatlands and Hersham, are the contractors, and Mr. George Vigers is the honorary architect. The external walls of the hall are already erected, and it will soon be roofed in.

CHURCH-BUILDING NEWS.

Dipton (Co. Durham).—The foundation-stone of a new church now in course of erection at Dipton has been laid by Mr. Joseph Dodds, M.P. for Stockton. It will be built from designs by Messrs. Oliver & Leeson, architects, Newcastle-on-Tyne, cruciform on plan, with central tower, in the Early English style of architecture.

Polegate.—Polegate Church has just received two additions to its interior. A memorial window, of three lights, represents the "Ascension," and is executed in antique glass of gem-like lustre. The window is dedicated to the memory of the late Mr. Caleb and Mrs. S. M. Diplock, by their daughter and sons. The other addition is a reredos, executed principally in Caen stone, enriched with marble panels and columns. Above the Communion-table are five Jeaune Fleury marble panels, richly inlaid, the centre one being a Maltese cross in Blanc Piastre, inlaid with Irish green marble, with jewels of Mexican onyx and Rosso Antico; the other four panels have religious emblems inlaid within double triangles of Rosso Antico and green marble. At each end of the reredos are the Commandments, &c., inscribed in gold letters on dove marble. The marble panels are divided by green marble and alabaster cluster shafts, surmounted with richly-carved cornice and cusping, supported by carved caps and arches. The work is returned some distance on the north and south walls of the chancel, with dove marble panels, &c., to match. On a plinth is the inscription:—"To the glory of God, and in loving memory of Caleb Diplock. Died July 26th, 1884. 'A man greatly beloved.'—Dan. x. 2. This reredos was erected by his affectionate widow." The window was designed and executed by Messrs. Cox, Sons, Buckley, & Co., of Southampton-street; and the reredos by Messrs. John Underwood & Sons, of Duke-street, Grosvenor-square, W.

North Molton (Devon).—The parish church of All Saints, North Molton, was re-opened on the 27th ult., after re-seating, and general repairs and alterations from plans by Mr. Ashworth,

architect, Exeter. The works, which have been in hand for the last five months, consist of newly flooring the church, and re-seating the nave and aisles with open seats of pitch pine, having tracery in the fronts. The walls have been re-plastered and pillars and arches repaired. The reseating the chancel in oak with improved seats formed part of the plan, but, as yet, this portion has not been carried out, nor has the pulpit been completed, which is to have figures of the Apostles placed in the niches. The outlay has been over 500*l.* for the internal work. The contractor is Mr. John Davey, of Barnstaple, and Mr. Pickard has done the wood-carving.

Pyworthy.—The Church of St. Swithin, Pyworthy, Devon, has been re-opened, after restoration. The architect was Mr. R. M. Fulford, of Exeter, and the contractor, Mr. Blowey, of Plymouth. Mr. Philip Shoebrook, of Northlew, was the foreman mason. The old pillars and arches of polyphant stone, which had been covered for years with plaster and whitewash, now present an admirable appearance. On the south side, near the priest's door, leading into the chancel, the builders found the remains of an old lepers' window, and by contrivance this has been left open. Missing and decayed portions of the stone-work of the south windows have been replaced by Hatherleigh stone, which has also been used for the new windows and repairs of the sedilium and copings. Messrs. Petherick, of Hatherleigh, carried out this work.

Longridge.—The new church at Longridge, dedicated to St. Paul, has been commenced, The architect is Mr. Ewan Christian, of London. At present only the nave will be built, and the foundation work for chancel and tower carried out. The cost of this work will be about 6,000*l.* The tenders have been let to Mr. Harrison, of Preston, for stonework; and Mr. Bell, of Longridge, and Mr. Robinson, of Longridge, have obtained the joiner's and plumber's work.

Pontardawe.—A mission church is about to be erected at Pontardawe in memory of the late Mr. Willian Gilbertson, by his son, Mr. Arthur Gilbertson, of Glanrhyd. The contract has been given to Mr. John Griffiths, builder, of Pontardawe, the plans having been prepared by Mr. Arthur Gilbertson and himself. The church is to seat 300 people.

Books.

The Works' Manager's Handbook of Modern Rules, Tables, and Data, for Civil and Mechanical Engineers, &c. By WALTER S. HUTTON. Second edition, carefully revised with additions. London: Crosby Lockwood & Co.

MR. HUTTON has produced a book full of information on most varied subjects, and, as a matter of course, has not escaped the common fault of all works of the kind. In taking up the volume one is struck by the scope and minuteness of the information supplied, and it is not until information on some definite point is required that one realises how much too much, and how much too little, there is in the 300 odd pages that go to make up the book. However, this is a defect common to all books of reference of this nature that we have ever met, and Mr. Hutton has done what he could to minimise the evil by dividing the work into six sections. If we only asked for more information, the author might retort that he has given as much as could be got in the space, but what an ordinary works' manager would ask for would not be larger quantity, but the substitution of more generally useful information for, say, the specifications of six locomotives, which occupy one-eighth of the whole book.

The language used throughout is simple and easily understood, being neither unnecessarily abbreviated nor too prolix, Mr. Hutton never sacrificing clearness of meaning to considerations of space. The use of technicalities and symbols has also been eschewed as far as possible, thus rendering the book pleasant to read, an unusual virtue in works of this kind. In some instances, however, the principle of avoiding technicalities has been carried to an extreme; for example, when the author hesitates to use the word "traverse," a term understood by every one who has had to do with machine tools, and in preference devotes a couple of lines to describing the motion of the tool.

The following are the headings of the six sections into which the volume is divided:—1. Stationary and locomotive steam engines, gas engines, &c. 2. Hydraulic memoranda: pipes, pumps, water-power, &c. 3. Millwork: shafting, gearing, pulleys, &c. 4. Steam boilers, safety-valves, factory chimneys, &c. 5. Heat, warming, and ventilating, metal cutting and finishing metals, alloys and casting, wheel-cutting, screw-cutting, &c. 6. Strength and weight of materials, workshop data, &c.

A good deal of information is given in the first part as to the action of steam in an engine cylinder, after which proportions of engines are set forth. We presume "works' managers" will not attempt to design steam engines upon the data given or the result may not be in every case satisfactory. For instance, the rule "Area of steam-port = area of cylinder in square inches divided by 12," may possess the merit of simplicity, but is rather a sweeping generalisation considering the different types of engine, and variations in length of stroke and piston speed they are subject to. The diameter of the cylinder is also taken as the sole factor by which the capacity of the feed-pump is arrived at. Mr. Hutton also gives what he describes as a diagram of the Joy valve-gear. This is certainly a very different arrangement to the ingenious device introduced by Mr. Joy, and is, in fact, a collection of links and connecting-rods that could not possibly work. The author, however, is not to blame for originating this wonderful device, as he has copied it from the pages of an engineering journal, but he might be expected to exercise closer supervision in the matter he selects even when quoting from an ordinarily reliable source. Further on (p. 22) we are told that "the piston speed in compound engines is usually 420 ft. a minute," a generalisation about as instructive as saying that the height of a tree is usually 40 ft., or the length of a street is usually a quarter of a mile.

The remarks on gas-engines might well have been extended beyond the four or five pages they occupy. The "Instructions for Fixing the Otto Engine" no doubt afforded the compiler an easy page of "copy." They are, however, hardly necessary, as they are invariably supplied by the makers when one of these engines has to be fitted.

In Section II. the hydraulic data are fairly complete so far as they go, but as this section only occupies twenty-two pages, it is naturally not very exhaustive. The few remarks on pumps contain sound advice, that might with advantage be taken to heart by some makers of engines in the present day.

Section III. opens with some brief particulars of spur and bevel gearing, in which the speed and power of toothed wheels are treated of. Crane gearing is noticed, and some particulars of driving by ropes are given. The longest table in the book is in this section, treats of "the weight and horse-power of cast-iron spur-wheels." Following this are some notes on shafting, in which a good deal of space is devoted to their "power," by which the author means the power they will transmit.

Section IV. opens with some general remarks on the effect of heat upon water, and the expansive force of steam, after which various details of boiler construction are dealt with in a somewhat disjointed manner. The proportions of different types of boilers in terms of their nominal power are given in five tables, but how this power is calculated is not stated. The few paragraphs which refer to riveting are quite inadequate to treat of this important subject. Mr. Hutton has missed a rare chance by not incorporating in his book an epitome of the recent researches of the special committee of the Institution of Mechanical Engineers on this subject. A few particulars of factory chimneys are given, amongst them directions for finding their "horse-power."

"Heat, Warming, and Ventilating," treated of in Section V., should prove one of the most useful divisions of the book for works' managers. There are tables of the specific heat of various substances, on the expansion of liquids and gases, on the heat, conducting power and expansion of metals, and on the radiation, absorption, and reflection of heat. The table which gives the length of 4-in. pipe required to heat a room of a given size to the desired temperature, is a valuable feature in this section; whilst the remarks on ventilation are to the point, although too brief to be of great practical use, and might well have been extended to the exclusion of the subject which follows,—the "Wind-pressure on Railway Structures," which has been copied from a current report.

The table of speeds of cutting-tools for metals is a useful feature, although we think the figures given for turning cast iron are somewhat above general practice for ordinary mixtures, with a moderately deep cut, but doubtless they could be undertaken with a good modern lathe. The next table, which gives the time required to do a given quantity of work by planing, shaping, slotting, drilling, and boring machines and lathes, should prove of greatest use to those having machine-tool workers under their supervision, but who have no data of their own on which to form an estimate. The conclusions appear to be the result of experience with high-class tools, and we doubt if many engineering contractors would care to have their bills checked by the figures quoted. This is a branch of the work to which Mr. Hutton might well devote special attention in a future edition. If the description of work and type of machine were stated it would add to the value of the information. The table well merits the greater space these details would require, especially in view of the great advance that has taken place within recent years in the efficiency of machine tools.

A table is given of mixtures of cast-iron for various purposes. This is a subject on which every foundryman has special and positive opinions, which no tables are very likely to effect. Brassfounders, as a rule, are more open to new ideas, but there is nothing very subversive of established practice in the full information on this point in Mr. Hutton's book. Section VI. opens with data on the strength and weight of materials of various kinds and in various forms. A table of multipliers for converting the weight of one metal into that of another is a useful feature, as also is a list in which the various names by which some often-used substances are known are grouped together, such, for instance, as sulphate of alumina and monoxide of lead, which every engineer would not at once recognise as simply alum and litharge. Six pages are devoted to various cements, ranging between cobbler's wax and boiler coverings. Workshop receipts are followed by remedies for workshop accidents. Following this is a short treatise on the new patent law, then some weights and measures, and a vocabulary of about twenty pages giving the French equivalents of a large number of engineering terms,—a very useful feature. A table of "Properties of Air," from Mr. Glaisher's observations, and a page setting forth the "mean annual rainfall at various places" are the last evidences of a weakness for paste and scissors to which the compiler too often succumbs.

School Hygiene and Diseases Incidental to School Life. By ROBT. FARQUHARSON, M.P., M.D., Edin., &c. London: Smith, Elder, & Co. 1885.

THIS work is partly a compilation from English and foreign books on the same subject, and partly a record of inferences drawn from the author's personal experience as the responsible medical adviser to Rugby and other public schools. It treats of school buildings, diet, work, play, diseases and doctoring, and on all the subjects the author has something to say, and says it with considerable literary skill. The first chapter, that on school buildings, is naturally the one most interesting to us. We cannot, however, see why the writer should go out of his way to gird at the architectural profession *en masse*. In his eyes, the architect is one who is either quite ignorant of his duties or so obstinate as to persist in wrongdoing out of mere perversity. "When you are about to build a school, select an architect who has had some experience in school design." Certainly,—most architects in fair practice have had such experience. "And one who is not too independent to adopt the suggestions of those whose opinions are entitled to consideration." We affirm that, as a rule, architects are too ready to give consideration to the opinions of others; and that their fault is rather an undue pliancy than the obstinacy they are charged withal.

Our predecessors of "centuries ago"—how many?—"paid little attention to convenience or sanitary arrangement"; and in consequence a "new school sprang up which enunciated the remarkable dogma that comfort was incompatible with outside beauty." What school? Where, and when, and by whom was

this "dogma" "enunciated"? Still, architects and builders "have gone with the times, and are vieing with each other in the perfection of all sanitary arrangements, and in combining a perfectly well-arranged plan with a picturesque elevation." (What more could be said?) Nevertheless, "we must look sharp after our architects," &c., &c. "All the details of drainage, ventilation, and water-supply, should be placed under the direct responsibility of the medical officer"; and we must be "on the alert to see that we do not sacrifice our health or risk our lives *to gratify* the ignorance or obstinacy of an architect." There is an almost spiteful force in the words we have italicised.

We accept without demur all that our author has to tell us on diet, exercise, training, on the physical and moral uses of manly games, and on the treatment of those special diseases which are incident to youth. In these subjects he is evidently at home, and we accept his utterances as *ex cathedrâ*. In the chapter on building, water supply, drainage (which is a difficulty, he says, in the country, "if there is *no river* at hand" (!) and most of all when he touches on the artistic side of architecture, it is easy to see that he is all abroad. The plan of his work required a chapter on school architecture, and, by the aid of quoted works,—from which Mr. Robson's is curiously omitted (an omission which in itself indicates Dr. Farquharson's entire ignorance of what architects have done in school work),—a chapter of the required length has been written; but it throws no new light on school planning and arrangement, and does not even attempt to treat of the *rationale* of the science.

History of the Corporation of Birmingham. Vol. II. By JOHN THACKRAY BUNCE, F.S.S. Birmingham: Cornish Bros.

"THERE'S no art to find the book's construction" in its outward look. Mr. Bunce's portentous volume,—158 cubic inches of literature,—has been lying, reproachfully, before us, unopened, for some time. What is the Birmingham Corporation to us, or we to it, that we should follow its fortunes through 600 closely-printed pages? But duty calls. We bend up each corporal agent to the terrible feat, when, lo! we find the dreaded book as entertaining as a novel.

It is not so much a history of the corporation as of their corporate doings. The author takes us pleasantly through the daily duties of the great social machine which the Corporation of Birmingham has invented and set in motion; and we cannot but admire with him the regularity and efficiency with which it behaves. At daybreak, 12,000,000 gallons of water,—pure beyond suspicion,—are pumped into reservoirs, and sent trickling in tiny streams through 400 miles of pipes, until every house in the borough is supplied with this essential of healthy life, unstinted in quantity, and always available. Two hundred miles of sewers carry their daily burden of 15,000,000 gallons of miscellaneous refuse to remote districts, where the solid elements are used to fertilise the land, and the liquid is purified, and poured—innocuous (so we are assured)—into the rivers.

An army of scavengers clear the streets of casual impurities, and convey them to destruction in the public furnaces; while another army of vigilant functionaries keep constant watch on doubtful neighbourhoods, and with one eye on suspected wells, and another on the belching factory chimneys, guard the general good of the community.

As the day wears on, the public markets are busy, and the long converging lines of multifarious produce arriving thither are ordered and controlled in the public interest.

By day and night the firemen,—those modern trained bands,—stand, like the warders in "Marmion," for ready need prepared. The poor sick are tended in well-appointed hospitals, always open for their reception. Parks, gardens, baths, free libraries, galleries of art foster the intellectual tastes of the people, or afford them wholesome recreation. Two thousand grimy toilers combine to illumine nightly 200 miles of streets and countless houses and factories; and when the shades of night fall upon this happy borough 500 policemen patrol the silent thoroughfares and protect the lives and property of the sleeping citizens.

Of course so much wise legislation for the public good does not go unrewarded. The death-rate,—that crucial test,—has declined from 24·96 per 1,000 in 1851 to 21·1 in 1884. The abnormally high rate of infant mortality, due for the most part to neglect, raises the general rate and depreciates unduly the general healthiness of the town. It is satisfactory to learn that the labouring classes are well and decently housed, and that overcrowding does not exist to an appreciable extent.

The Surveyor to the Corporation we are told has filled his onerous post for thirty years, and has seen all the great schemes for the improvement of the borough carried out. His office is by no means a sinecure,—3½ millions of money have been expended on public works during his administration, and an annual average of 1,700 plans for new buildings or additions to existing ones require his examination and approval.

But we have no space to devote to even a bare enumeration of the subjects which are treated of at length in the book before us. We congratulate the author on having by his skill invested a subject which in ordinary hands would be the dryest of the dry with a real and living interest.

Illustrated Lectures on Ambulance Work. By R. LAWTON ROBERTS, M.D., Member of the Royal College of Surgeons, &c. London: H. K. Lewis.

IN these days when "Nursery" and "Ambulance" have become household words in so many families, the title of this book will be enough in itself to ensure it many readers, and, from another point of view, such a book should be of interest to workmen in the building trades, who are so often exposed to sudden accidents and injuries; as well as to those who employ or overlook them.

It is written in plain and simple language, the writer wisely avoiding all technical names, which, in truth, only tend to confuse the minds of the uninitiated, and are of no avail in helping them to render aid in cases of emergency.

The first part of the work is devoted to the explanation of the structure and mechanism of the human frame, and there are several good illustrations showing the bones, arteries, and plan of the circulation.

The treatment of wounds, fractures, and burns is described most thoroughly, and the numerous diagrams illustrating the methods of applying splints and bandages cannot fail to be of great use to those who are unable to have personal instruction.

The last chapter in the book deals with the conveyance of sick and injured persons, and gives the stretcher exercises advocated by the St. John Ambulance Association. To our mind, the book would have been more complete had a few pages been given to the common laws of hygiene, and the treatment and tending of patients during the weeks of sickness which necessarily follow any severe injury.

The writer evidently wishes to impress upon his readers the importance of immediate action, and carries out to the letter the advice we once heard a doctor give to a class of ambulance pupils,—"In the case of any sudden emergency or accident make up your mind *at once* what you will do, and do it."

French-Polishing, &c. By A PRACTICAL MAN. London: Wyman & Sons.

THIS excellent little work gives much more information than a hasty glance at the title leads one to expect, for the author deals clearly and concisely with graining, marbling, japanning, inlaying, wax-polishing, and many other matters which every one at some time may wish to have explained; and he has discharged his task in a style which shows that he is testifying to that which he does know. Numerous useful recipes for stains, varnishes, &c., add to the value of the book, and a careful index supplies the finishing touch.

Our Dwellings, Healthy and Unhealthy. By CATHERINE M. BUCKTON. London: Longmans, Green, & Co.

IT is a curious sign of the times that a work of this kind should have been written by a woman. It comprises fourteen essays, reaching from such feminine subjects as the choice of curtains and carpets to the trapping of house-drains and the application of the water-test. Nor is the subject treated in a superficial or second-hand manner. The essays were originally delivered as lectures to the girls in the Leeds School Board schools. They were illustrated by models contrived for the purpose, and they one and all show a somewhat surprising acquaintance with the technicalities of the subject. The professional reader will not meet with anything that is new. But the essays were not written for him: they are appropriately dedicated to the housewives of England, and every housewife would be the better for taking to heart the lessons so clearly and accurately given in this little book.

Tables for Setting out Curves from 101 ft. to 5,000 ft. radius; useful for Setting out Roads, Sewers, Walls, Fences, and general Engineering Work. By H. A. CUTLER and F. J. EDGE. London and New York: E. & F. N. Spon. 1885.

THIS is intended to supply a handy guide for setting out curves for general work, the authors observing that the methods for which tables of this kind have been hitherto published are only applicable to railway work. The setting-out is given in offsets from a tangent, at regular distances. The tables are intelligible even to a workman who may not follow the formula on which they are based. The book is very small, though clearly printed, and convenient to carry about.

RECENT SALES OF PROPERTY.

ESTATE EXCHANGE REPORT.

AUG. 25.

By FLEURET & SON.

Wood-green, Naas-road—A plot of freehold land ...	£145

By W. H. MOORE.

Euston-square—75, Drummond-street, 38 years, ground-rent 18*l.* 18s.	410

By J. H. GREEN & SON.

Hammersmith — 42, Southerton-road, 82 years, ground-rent 6*l.*	285
Barnes—13, Castelnau-gardens, 54 years, ground-rent 1s.	750
Hammersmith — 25, Black Lion-lane, 60 years, ground-rent 3*l.*	275

By DEBENHAM, TEWSON, & Co.

Pimlico — 24, Westmoreland-place, 48 years, ground-rent 9*l.*	470

AUG. 26.

By H. J. BLISS & SON.

Bethnal-green—2 and 4, White-street, freehold.....	860

By FREDK. STOCKER.

Ladywell — "Vine" and "Gentry" Cottages, freehold	280

AUG. 27.

By C. & H. WHITE.

Caledonian-road—68, Bemerton-street, 59 years, 6*l.*	350
Brixton—175, Shakspeare-road, 87 years, Ground-rent 5*l.* 10s.	220
Kennington — 268, Kennington-road, 48 years, ground-rent 3*l.*	300
No. 10, Wynyard-terrace, 18 years, ground-rent 2*l.*	135

By HERRING, SON, & DAW.

Upper Tulse-hill—88, term 38 years, ground-rent 12*l.*	525

By E. STIMSON.

Peckham—57 to 71 odd, Ansdell-road, 87 years, ground-rent 34*l.*	1,910
Battersea—25 to 31, Bolingbroke-road, 38 years, ground-rent 16*l.*	850
New Kent-road — 116, Falmouth-road, 8 years, ground-rent 5*l.*	150
Hackney, Well-street—"The Star Inn," freehold	520

By NEWBON & HARDING.

Islington—30 and 31, Cloudesley-place, 31 years, ground-rent 26*l.*	440
Wapping—21 to 25, Star-street, and 1 to 4, Sconces-alley, 20 years, ground-rent 39*l.*	250
Seven Sisters-road—77 to 81, Devonshire-road, 67 years, ground-rent 26*l.* 8s.	1,470
Mile-end—8 and 55, Moody-street, freehold	770
Woodford—Two plots of freehold land	145

By G. B. SMALLPEICE.

Haslemere Station, near—The residence called "Dickhurst," and 103a. 3r. 4p.	5,150
Enclosures of heath land, 53a. 2r. 16p. copyhold...	2,630

By THOMAS GLOVER.

Brixton-road—A piece of land, called the Oval, 20 years, ground-rent 10*l.*	155
No. 5, the Oval, 20 years, ground-rent 26*l.*	505
No. 409, Coldharbour-lane, with paddock, 20 years, no ground-rent	500
No. 411, Coldharbour-lane, 20 years, no ground-rent	200
No. 433 and 435, Coldharbour-lane, 20 years, no ground-rent	305
No. 445 and 447, Coldharbour-lane, 20 years, no ground-rent	800
Leasehold Ground-rents of 96*l.* 10s. per annum, 20 years	1,012
Nos. 408 and 410, Coldharbour-lane, 17 years, ground-rent 5*l.*	180
A Ground-rent of 18*l.* per annum, together with three cottages, 17 years, ground-rent 23*l.* 10s.	220

Builders' Benevolent Institution.—The next annual dinner in aid of the funds of this excellent trade charity will be held, as has already been mentioned in the *Builder*, in Carpenters' Hall, London Wall, on November 5, Mr. Arthur Charles Lucas in the chair. As the number of seats available is strictly limited to 200, early application must be made for tickets. An advertisement in reference to the matter will be found on our front page.

The Student's Column.

DESCRIPTIVE GEOMETRY.—PART II.

XV.

Find a plane, P, tangent to a surface of revolution, and passing through a point, x, in space, also mark the point of contact, m, where the plane, P, touches the surface.

WE have already seen, in fig. 145, that there are also an infinite number of planes which satisfy this question; we must, therefore, as in the preceding case, limit the problem to finding the plane tangent to the surface, either on a given meridian or on a given parallel thereof. If we determine the curve on which all the points of contact, m, are to be found, we shall have the limit of the shade of the surface of revolution when lighted by a candle, and also, what is perhaps of more practical importance to us, the outline of the surface seen in perspective by a spectator with his eye placed in the point x.

Find the point of contact, m, along the meridian, o y.

If from all the points of the given meridian, $o\,y$, we carry a series of lines perpendicular to the plane of that meridian, we shall have formed a horizontal cylinder; and it is evident that any plane tangent to the surface of revolution along that meridian will be also tangent to the horizontal cylinder, of which the meridian is the base. The problem is, therefore, reduced to find the plane P passing through the given point x, and tangent to a cylinder, a problem solved in fig. 100.

We take through the point x a parallel to the generators of the cylinder, find its foot, p, on the plane of the cylinder's base, and the trace of the plane, P, will pass through the point p, and be tangent to the base. All this is applicable to our case, only we must remember that the base of the cylinder is the meridian $o\,y$. We can readily draw the projections of the line $x\,p$, for they are perpendicular to the plane of the meridian, $o\,y$. To get the trace of the plane, P, on the plane of the meridian, $o\,y$, we rotate the plane of this meridian round the axis of the surface of revolution until it be parallel to the elevation; then the point p comes to p^1, and the tangent, $p^{1v}\,m^{1v}$ is the trace P^{1v} of the tangent plane P. When we rotate back the plane of the meridian to its former position, m^1 comes to m, the position of the point of contact, and P^{1h} comes to P^h, the horizontal trace of the tangent plane, P. (See fig. 154.)

Special Points.

The points a situated on the equator are found at once; as the tangent planes are in that case vertical, we have only to make $x^h\,a^h$ tangent to the plan of the equator.

The points, b, situated on the meridian which forms the outline of the elevation, are also readily found by making $x^v\,b^v$ tangent to the meridian.

The points d, which are situated on the meridian, the plane of which contains also the point x, are, of course, the highest and the lowest points of the curve of contact. To find them, we need only rotate the point x round the axis of the surface, draw the tangents to the elevation from x^{1v} and then rotate back.

As the meridian plane which contains x divides the curve on the plan in two symmetrical parts, so the line $d^h\,d^h$ is, in our case, a minor axis of the ellipsis. On the elevation, the points d^v form the ends of a diameter of the ellipsis of contact, we need only find the other conjugate diameter to draw the curve of contact without the help of any other points. (See Gwilt's "Encyclopædia Conic Sections.")

In fig. 154 we have shown the various operations described above; in fig. 155 we have shown the surface shaded, and left out all lines of construction.

Find the point of contact, m, along the parallel c.—This is a much more expeditious operation than the one on the meridian, and is based on the fact that the plane tangent to the surface along the parallel c is also tangent to a cone which touches the surface of revolution along the parallel c.

The problem is, therefore, reduced to producing a plane tangent to a cone and passing through a point outside the cone, a problem we have solved before in fig. 103. We should join the point x with the apex of the cone, find the foot of that line on the base of the cone, and then from that foot carry parallels to the base; but all this complicated operation is done away with by simply selecting as the base of our cone that which is in the same horizontal plane as the point x itself, and then, of course, the tangents from the point x to that base will be the traces of the tangent planes. To find the foot of the generators of the cone along which the planes are tangent we need only have the points of contact a, which we find on the circle of diameter $o^h\,x^h$; we then draw the generators of the cone, and at their intersection with the plan of the parallel C we get points, such as m, belonging to the limit of the shade. Whatever parallel we select, the same circle of diameter, $o^h\,x^h$, will serve to find the generators, G, of the enveloping cone, so that the operation is practically *very simple*.

In our figure there is another parallel of the same size as the parallel C; but, beyond the fact that both parallels have the same hori-

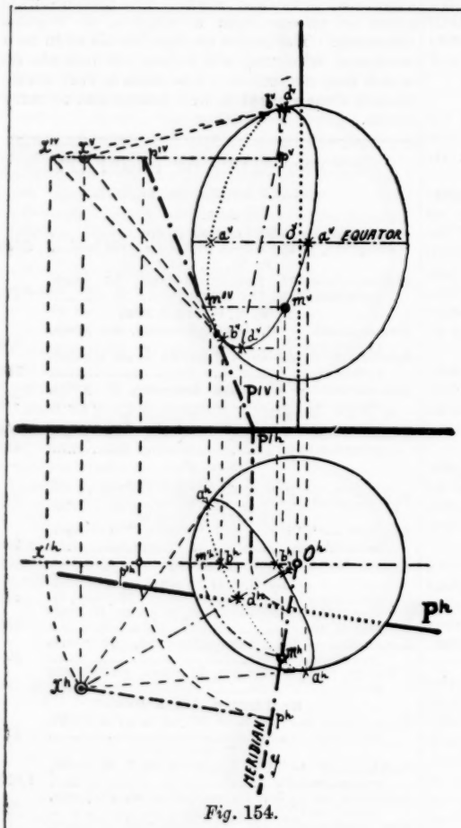

Fig. 154.

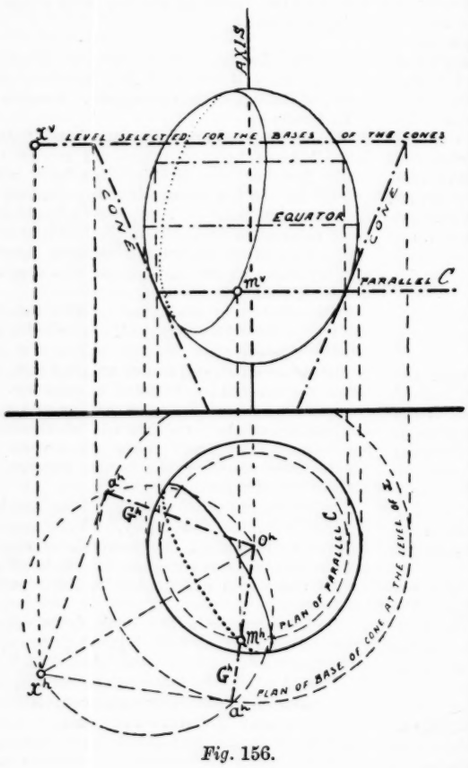

Fig. 156.

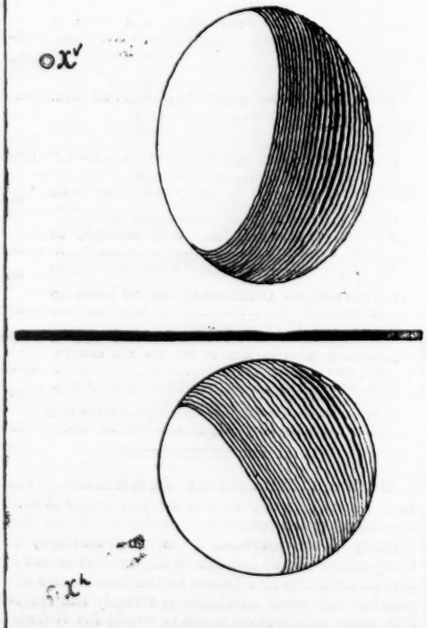

Fig. 155.

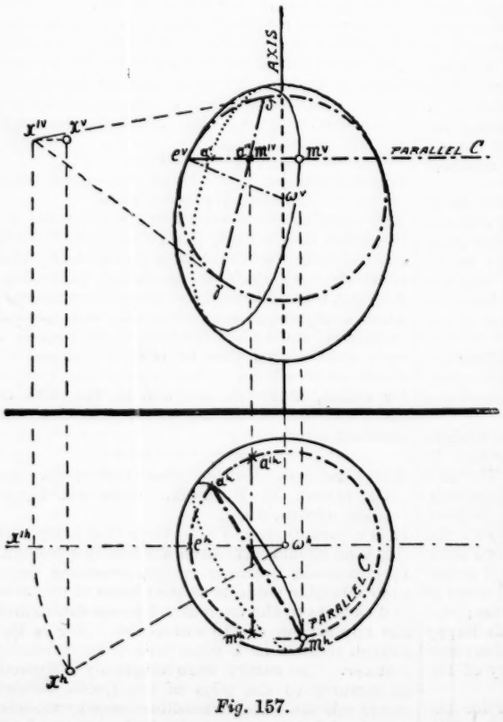

Fig. 157.

zontal circle for their plans, there is no special abridgment, as was the case in fig. 152. (See fig. 156.)

Third Method.—Find the point of contact, m, along a parallel, C, by the help of a sphere, which touches the surface of revolution all along the parallel, C.

If we make $e^v\ \omega^v$ normal to the outline of the surface of revolution, and with $e^v\ \omega^v$ as radius describe a circle, it is evident that, when that circle revolves round the axis of revolution, it will produce a sphere which will touch the surface of revolution all along the parallel, C. We know that the curve of contact of a cone, with its apex in x circumscribing the sphere will be a circle; now, if we rotate the apex x to x^1, so as to bring the axis of the cone parallel to the elevation, the plane of the circle of contact will be perpendicular to the elevation, and the whole of the circle will be projected on the straight line, $\gamma\ \delta$. The planes of the circle of contact and the parallel will cut one another along the cord $a^1\ m^1$, the plan of which is $a^{1h}\ m^{1h}$. Revolving backwards, we then get the points a and m, which belong both to the sphere and the surface of revolution, and are, therefore, points of the curves of contact to both surfaces. (See fig. 157.)

We have given here the theory of the construction of the shades of surfaces of revolution; later on, we shall apply our methods to finding the shades of various architectural features, bases, caps, arches, archivolts, details of ironwork, &c., and, therefore, the student should diligently study the eight preceding figures.

RECENT PATENTS.

ABSTRACTS OF SPECIFICATIONS.

4,420, Mitre Cramp. T. J. Syer.

The bed-plate and hinged sides are made of metal, the latter being lined with wood. The sides are moved inward by means of lugs which are pressed by cones on a screw-spindle, the return movement being caused by a spring. A triangular piece is moved up by a screw, the work being held between it and the sides.

5,889, Window. W. Meakin.

The sashes, instead of running between beads on the stiles of the ordinary fixed frame, run on the stiles of an interior frame pivoted to a fixed frame near the top. The pulleys carrying the cords and counterpoise weights are fixed in the usual manner. The inner frame with the sashes can be swung into the room for cleaning or other purposes, it is secured when shut by bolts or other fastenings, and may be provided with a strut to keep it open when required.

7,490, Ceilings. W. Clark.

Bearers, the length of which may be adjusted to fit any sized room, are fixed between the walls, or suspended from the joists. They are adapted to support boarding of sufficient strength to carry without sagging the weight of the material used to form the ceiling. Selenitic lime is used in combination with other materials, and the mixture is plastered in from the top before the flooring is laid. Netting or separate wires may be nailed to the joists instead of the common lathing. In fireproof floors the joists are strutted by cramps driven into the sides of the joists, and an additional layer of selenitic lime and sawdust is applied; the lower edges of the joists are grooved so as to form a key to support the fireproof material. A second layer of fireproof material may be laid on the top of the joists. Walls and partitions may be plastered in a similar manner, and by employing suitable moulds the method may be made applicable to ornamental ceilings.

8,415, Chimney-top. J. Brierley.

Two or more concentric screens of wire-netting rack, with a double loose or hinged lid are supported on the chimney-top by brackets.

8,468, Lavatory Basin. H. Sutcliffe.

The brush and soap traps drain into the basin by passages moulded on. The supply-cocks are also fitted on blocks made solid with the basin. A ring also is soldered in the basin, to which is attached a chain carrying the plug.

8, 675, Slating Iron Roofs. W. Middleton.

A piece is cut out of the centre at the head of each slate, leaving pieces projecting on each side to rest on the angle irons without interfering with the lap.

15,334, Lead Glazing. F. Hobbs.

The space between the lead and glass is filled in with plaster of Paris mixed with any material to retard setting, and afterwards mixed with oil.

8,317, Cements and Pavements. J. Fottrell, Dublin.

The cements employed for paving and other purposes are mixed with a powerful disinfecting agent, either in a solid or liquid form in order to neutralise exhalations from the litter, &c., in the roadway. Fresh disinfectant is exposed as the surface is worn away. In the case of wood pavements the mixture may form a layer below the wood, and be pierced here and there for the escape of rain-water.

8,297, Adjusting Door Knobs to Spindles. C. Tighe.

The knob has a hole or slot made in it, through which a pin is inserted engaging on the notches on the spindle. The pin is kept in place by the rose which is screwed on the knob; or in another form the rose may be attached to the door by screws.

APPLICATIONS FOR LETTERS PATENT.

Aug. 21.—9,914, B. Cartwright, Screw Fasteners for Corrugated and other Iron Sheets.—9,917, C. Longbottom, Securing Door Knobs or Handles.—9,935, R. Winn, Lavatory Basins and Appliances.—9,942, G. Beadon, Doors and Door-fastenings.—9,954, R. Thomas, Improved Ball-cock.

Aug. 22.—9,972, J. Royle, Improvements in Suspended Gas-lights from existing Gas-fittings.—9,985, T. Bell and others, Rock-drilling Apparatus.—9,987, J. Castelle, Jointing or Coupling together Leaden Pipes.

Aug. 24.—9,998, C. Wharton, Self-acting Window Sash-fasteners.—10,021, W. Lake, Improvements in Revolving Shutters.

Aug. 25.—10,026, A. Bell, Car Ventilators.—10,033, S. Sutcliffe, Tile Hearths and Fenders.—10,036, D. Doyen, Door Checks or Closers and Annunciators.—10,038, W. Large, Improvements in Nails.—10,048, M. Shirlaw, Securing Sliding Sashes of Windows.

Aug. 26.—10,082, J. Storer, Preparing Materials for Roofing.—10,087, J. Johnson, Window-sash Fastener.—10,091. C. Newton, Socketed Drain and other Pipes.—10,115, A. Martin, Covering Roofs and other Structures with Sheet Metal.

Aug. 27.—10,158, W. Duffy, Wood-block Flooring.—10,159, J. Armstrong, Application and Adaptation of Terra-cotta for the purposes of Electric Lighting.—10,183, W. Lake, Automatic Fire-extinguishing Apparatus.—10,184, W. Gittins, Portable Cranes.

PROVISIONAL SPECIFICATIONS ACCEPTED.

13,738, J. Carruthers, Folding Shutters for Shop-windows, Doors, &c.—8,508, R. Stanley, Machinery for Pressing and Moulding Bricks, Tiles, &c.—8,748, A. Reddie, Rock-drills.—9,147, W. Ward and others, Opening, Closing, Regulating, and Securing Fanlights, Windows, Ventilators, &c.—9,239, B. Stockman, Improvements in Water-meters.—9,289, F. Higgins, Connexions of Speaking Tubes, &c.—4,084, S. Redfern, Improvements in Bakers' Ovens.—8,339, A. Edmondson and Others, Safety-step Ladder-hinge.—8,485, A. Emery, Eye Links or Bars for Bridges, Buildings, &c.—8,558, W. Macrone, Appliance for Checking Workmen's Time.—9,171, W. Walker and others, Fluid-tight Joints for Pipes.—9,211, H. Gibbs, Flushing Water-closets.—9,370, J. Wailes, Apparatus for Cutting or Excavating Drains, Trenches, &c.

COMPLETE SPECIFICATIONS ACCEPTED.

Open to opposition for two months.

11,541, J. Keyser, Improvements in Stoves.—13,314, W. & W. R. Lester, Glazing Bars or Astragals for Roof-lights and Windows.—13,692, A. Dennison, Machinery for Cutting Wood for Marquetry and Parquetry Work, &c.—13,719, T. Helliwell, Securing and Fixing to Roofs, Flats, or Sides of Buildings, Sheets of Zinc, Copper, Iron, &c.—13,779, J. Walker, Attaching Door-knobs to Spindles.—13,824, E. Grach, Manufacture of Mosaic, &c.—14,417, J. Ball and Others, Combined Ferrule and Bolster for Chisels and Gouges.—8,989, O. Hertrampf, Brick Kilns.—14,567. G. Connell, Improvements in Roof Windows.—15,953, J. Stevens and C. Major, Hydraulic Lifts.

Erratum.—In the column of "Abstracts of Specifications of Patents," in the *Builder* for Aug. 29, "No. 5,256, W. Tupper, an improved coping tile," &c., should have been "No. 5,255, W. Tuffee."

Miscellanea.

Ravenna.—A *Times* telegram from Rome states that King Humbert has signed a decree authorising the establishment of a Byzantine Museum at Ravenna. The Board of Public Works has approved a scheme of extensive works for the preservation of the celebrated Church of San Giovanni Battista at that place.

Trade Union Congress.—The eighteenth Annual Congress of Trade Unionists will commence on Monday next at Southport.

The British Association for the Advancement of Science will commence its Aberdeen meeting on the 9th inst.

Honour to a Civil Engineer.—The Queen has been graciously pleased to confer the distinction of Knight Commander of St. Michael and St. George on Mr. John Fowler, C.E.

Glasgow Iron Pipes for the Colonies.—It was reported in Glasgow yesterday that Messrs. Macfarlane, Strong, & Co., of the Lochburn Iron Foundry, had received a contract for 1,000 tons of iron gas-pipes for the gas corporation of Adelaide. Some time ago the South Australian Government resolved to confine their contracts for water-pipes to the Colonial founders, but it seems the gas companies are determined to buy in the cheapest market, and it is reported that on this small contract alone there was a difference of something like 1,000*l.*, including freights, &c., to Adelaide, from the lowest Colonial offer. It is expected that a contract for 20,000 tons of iron pipes will be closed shortly, and a firm in the Clyde district is expected to secure the contract. Several orders for water and drainage pipes have been booked during the last few weeks, and there is every prospect of the Scottish pipe-founders being well employed throughout the coming winter.—*Scotsman*, Aug. 28.

Temple Bar.—According to the *Metropolitan*, "Old Temple Bar is at length to be re-erected. It will be remembered that a few years ago the ancient structure was taken down, and the stones as marked were stored in Farringdon-road. It now appears that they are to be utilised for the rebuilding of the historical old structure, the directors of the Albert Palace Company having purchased them from the Corporation, and that in a short time the ancient gateway in Fleet-street which marked the City boundary will re-appear in all its old historic and archæological proportions as the main entrance to the new palace at Battersea." Whatever may be the proportions which are thus described, the proposal to re-erect the old gateway at Battersea is absurd. Surely a place could be found for it in, or as an entrance to, the Temple; or, at any rate, somewhere in the city.

A New Magnetic Telephone.—The Signal Engineering Company, of 181, High Holborn, have introduced a new magnetic telephone. It is put up in vulcanite cases like the Bell receiver, and has a magnet and the usual bobbin of wire round the pole, but there the resemblance to the Bell instrument ceases, for the diaphragm is a membrane prepared in a special manner to protect it from the effects of the atmosphere. To this membrane is attached a piece of hardened steel, and that being attracted by the magnet, puts the diaphragm into vibration, and so transmits or receives the sounds produced by the voice of the speaker, as conveyed by the variations produced in the current.

The Reconstruction of Aldershot Camp. The *Army and Navy Gazette* says:—"The reconstruction of Aldershot Camp is proceeding slowly, but surely. A sum of about 40,000*l.* has been already expended in the North Camp during the past four years in the erection of brick huts. About two battalions of infantry can be accommodated in these new buildings. The vote for camp reconstruction for the years 1885–86 is only 10,000*l.*, and this sum is now being expended in the erection of officers' quarters. It is expected that a much larger sum will be allotted under this head next year, when the whole of the North Camp will be completed."

Proposed Art and Industrial Exhibition, Balham.—We have received the preliminary prospectus of this Exhibition, which it is intended to open early in 1886. The exhibits are to include, amongst other things, glass work and pottery, metal work, carpentry, drawing, designing, painting, engraving, carving or decorative work in brick, stone, or wood, engineering, plumbing and gasfitting, turnery and fretwork, plasterwork, and models and apparatus. Prizes are to be awarded for merit in the groups and classes. The secretary is Mr. W. Shimell, 23, Alderbrook-road, Balham.

Awards at the Inventions Exhibition.—Messrs. Candy & Co. (Limited), of 11, Queen Victoria-street, write:—"Will you kindly correct an error in your reference to our award at the 'Inventions' which was copied from the one in the early official list? We are stated to have received a silver medal for 'enamelled iron' instead of for 'terra-cotta, facing and paving bricks, and architectural terra-cotta and stoneware goods.'"

Sanitary Institute of Great Britain.—An Exhibition of sanitary apparatus and appliances and articles of domestic use and economy is to be held in the Floral Hall, Belgrave Gate, Leicester, from September 22nd to October 10th, in connexion with the eighth autumn congress of the Institute.

Richmond Drainage.—The Vestry authorities of Richmond, since the release of the district from connexion with the Lower Thames Valley Sewerage Board, have been deliberating, in common with most of the other constituents of that now dissolved Board, over the question of a separate drainage scheme for the district. Mr. H. M. Ramsay, surveyor to the Twickenham Local Board, has submitted to the Main Drainage Committee of the Richmond Vestry, a scheme for the drainage of Richmond, Petersham, and Ham, which appears to receive generally favourable comment. He proposes to collect the whole of the sewage into a main outfall sewer, extending along the towing-path from Argill-lane to a pumping-station to be erected in the neighbourhood of Ham Fields. Thence it would be conveyed across the river, and by means of a rising main, to a site at Hanworth, where it could not only be purified for discharge into the river, but also disposed of to the occupiers or owners of surrounding land for cultivation purposes. The estimated cost of the scheme is 23,030*l*. There is an alternative scheme, the cost of which is estimated at 31,980*l*.

The Reduction of the Death-rate.—Civil registration was first established in 1838, and the mean annual death-rate of England and Wales for the thirty-eight years (1838 to 1875 inclusive) was 22·30 per thousand, the mean annual rate for the first eighteen years being 22·42, and for the last twenty years 22·19, an improvement of only ·23. The mean annual rate for the eight years 1876–1883, both inclusive, was 20·26, the difference between the mean annual rates for the years 1856 to 1875 and 1876 to 1883 showing an improvement of 1·93 per thousand, or an apparent saving of 49,320 lives annually, although, as the age distribution of the population has altered, the number of lives actually saved would be somewhat less. Besides the diminished mortality, it must be remembered that preventable sickness bears a regular proportion to preventable deaths, and if we estimated this at the low proportion of twenty-five cases to each death we get upwards of a million cases of sickness annually prevented in the period from 1876 to 1883 had the death-rate remained stationary, and not decreased in the way mentioned. Surely these results are eminently satisfactory.—*Sanitary Record.*

The Corporation Coal Duties.—From a return of the coal duties at 4d. and 9d. per ton received by the Corporation of the City of London, it appears that a sum of 167,374*l*. was obtained last year from the 4d., and 376,592*l*. from the 9d. The major portion of these sums was expended on account of the Thames Embankment and the Metropolitan Board of Works Improvement Fund. An account prepared by the Metropolitan Board of Works showed that their interest in the coal duty at 9d. produced 302,787*l*., and the wine duty 9,396*l*., which sums had been devoted to the repayment of loans.

A New Welsh Wesleyan Chapel.—The memorial stones of a new Wesleyan Chapel have been laid at Llanfairpwllgwyngyll trisiliologogoch in Anglesea. It is in the Beaumaris circuit, and will cost 720*l*., of which all has been promised except 100*l*. It will probably be found to have the longest name of any Wesleyan place of worship in Great Britain.—*Liverpool Daily Post.*

Messrs. B. J. Hudson & Sons, timber merchants and saw-mill proprietors, of Whitfield-street, W., Store-street, W.C., and Great Peter-street, S.W., have taken over the business lately carried on by Messrs. Hudson & Carr, at Millbank Saw Mills, S.W., Pimlico Wharf, S.W., and 61, Endell-street, W.C., and intend carrying it on in conjunction with their own as usual.

Lancashire and Cheshire Antiquarian Society.—On Saturday last between thirty and forty members of this Society proceeded to Prestbury to visit the fine old churches there. On arrival they were met by Mr. James Croston, F.S.A., and Dr. Richmond, the churchwardens; Dr. Renaud, F.S.A., and Mr. Stephens, the architect.

A Workmen's Club at Dublin.—A new building for the City of Dublin Working Men's Club, situate at 10, Wellington-quay, has been completed. It has cost 1,400*l*. The work has been done by Messrs. Golding Bros., of Tara-street, under the direction of Mr. W. H. Beardwood, architect, Brunswick-street.

Scamped Drainage Work to Houses.—At the meeting of the Cymmrodorion Society at Aberdare last week, a paper by Dr. Isambard Owen, of London, "On the Requirements of Workmen's Dwellings considered as Healthy Residences" was read. Incidentally he referred to the subject of defective drainage, observing that "builders in general, and speculative builders in particular, paid little attention to the requirements of sanitation. Their foremen were apt to pay still less, and the labourers employed to lay the drains not unnaturally paid least of all. The earth, like charity, covered a multitude of sins, and it was not until years after, when the presence of villainous smells and the prevalence of illness among the children of a house suggested the inspection of the drains that the multitudinous sins of omission and commission were brought to light. And then, even in the best class of houses, a terrible spectacle was often revealed. Drains made of old and cracked pipes, drains laid without cement, drain-pipes with flanges the wrong way up, drain-pipes laid with 6 in. interval between them, drains without sufficient fall, or even the fall the wrong way; curved drains made out of straight drain pipes, joints constructed by the simple process of knocking a hole into the side of an already laid pipe; drains laid only half way to the sewer, or straight up to the river without any communication being established between the two,—these and their necessary consequence, a soil reeking with sewage matter, were the every-day discoveries of the sanitary inspector." We venture to think that the author's accusations against "builders in general" are somewhat too sweeping. There are, unfortunately, many who do such things, but there are many others who do not and would not.

"Mansions in Skye."—The *Daily News* correspondent among the crofters, writing from Glendale, Skye, says:—

"There are three kinds of mansions in Skye, and Skye may be regarded as presenting a pretty fair representation of the average condition of crofter and cotter life throughout the Highlands and islands. The first are significantly known as black houses, the second are called white houses, and the third,—of which there are comparatively few specimens,—are comfortable cottages, built of stone, with chimneys and windows tiled or slated. This latter is a class of which personally, after wide peregrinations in Skye, I have not made the acquaintance. Of course, the houses of the large farmers are decently and stoutly built; but as for the crofters, their residences are almost exclusively the black houses. In Islay there are plenty of white houses, but they are inhabited chiefly by fisher-folk and labourers in the distilleries. In Orkney and Shetland and on the eastern coast, whilst the black houses are made by the unaided efforts of the crofters, the white houses are built partly with skilled labour with the assistance of the landlord. The tenant collects the materials and helps in the building, the landlord usually providing the timber for the roof and for the partitions. Mortar is used in building the walls, whereas the black houses are innocent of mortar. In the white houses the floors are invariably covered with wood, the roof is well thatched and sometimes even slated. In brief, it may be said that if white houses were the rule throughout the Highlands there would not be much cause for complaint with respect to the residences of crofters."

Electric Light Installations.—The *Surrey Advertiser* of August 29 contains particulars of an important electric installation, which has been carried out by Messrs. B. Verity & Sons, of King-street, Covent Garden, at Cobham Park, and which appears to be very successful. Messrs. Verity & Sons are now engaged in lighting up the "Criterion" Restaurant with 540 incandescent lamps. They are also completing a large installation for the Naval and Military Club, Piccadilly, this being the first Club in London to adopt the electric light; and they have the contract for the whole of the electric lighting at the Constitutional Club, Northumberland Avenue.

PRICES CURRENT OF MATERIALS.

TIMBER.	£.	s.	d.	£.	s.	d.
Greenheart, B.G. ....ton	6	10	0	7	10	0
Teak, E.I. ....load	12	10	0	15	10	0
Sequoia, U.S. ....ft. cube	0	2	6	0	2	9
Ash, Canada ....load	3	0	0	5	0	0
Birch ,, ...	3	0	0	4	10	0
Elm ,, ...	3	10	0	5	0	0
Fir, Dantsic, &c.	1	10	0	4	10	0
Oak ,, ...	3	0	0	5	0	0
Canada	6	0	0	7	0	0
Pine ,, red	3	0	0	4	0	0
,, yellow	3	15	0	5	5	0
Lath, Dantsic ....fathom	5	0	0	6	0	0
St. Petersburg	5	0	0	7	0	0
Wainscot, Riga....log	3	0	0	4	10	0
Deals, Finland, 2nd and 1st...std. 100	8	0	0	9	0	0
,, 4th and 3rd	6	10	0	7	10	0
Riga	7	0	0	8	10	0
St. Petersburg, 1st yel.	10	0	0	17	0	0
,, 2nd ,, ...	8	0	0	9	15	0
,, white	6	10	0	11	0	0
Swedish....	7	0	0	17	0	0
White Sea	8	10	0	19	0	0
Canada, Pine 1st	18	0	0	32	10	0
,, 2nd	12	0	0	18	10	0
,, 3rd, &c.	7	0	0	10	10	0
,, Spruce 1st	9	0	0	12	0	0
,, 3rd and 2nd	6	10	0	8	0	0
New Brunswick, &c....	5	0	0	7	10	0
Battens, all kinds	4	0	0	13	0	0
Flooring Boards, sq. 1 in.—Prepared, first	0	9	0	0	13	0
Second	0	7	6	0	8	6
Other qualities	0	5	0	0	7	0
Cedar, Cuba....foot	0	0	3½	0	0	4
Honduras, &c.	0	0	3	0	0	4
Australian	0	0	3	0	0	3½
Mahogany, Cuba	0	0	5	0	0	7½
St. Domingo cargo av.	0	0	5½	0	0	7½
Mexican ,, ...	0	0	4	0	0	5
Tobasco ,, ...	0	0	4	0	0	6½
Honduras ,, ...	0	0	4½	0	0	6½
Rose, Rio ....ton	7	0	0	17	0	0
Bahia....	6	0	0	15	0	0
Satin, St. Domingo .... ft.	0	0	8	0	1	0
Porto Rico	0	0	8	0	1	3
Walnut, Italian	0	0	4	0	0	5

METALS.						
IRON—Pig in Scotland ....ton	2	1	6	0	0	0
Bar, Welsh, in London....	4	15	0	5	2	6
,, ,, in Wales	4	7	6	4	12	6
,, Staffordshire, London	6	0	0	7	0	0
Sheets, single, in London....	7	10	0	9	0	0
Hoops ,, ...	6	10	0	7	10	0
Nail-rods ,, ...	6	0	0	7	0	0
COPPER—						
British, cke. and ingt. ....ton	45	10	0	46	10	0
Best selected	47	0	0	48	0	0
Sheets, strong....	55	10	0	56	0	0
,, India	52	0	0	53	0	0
Australian, fine cash....	0	0	0	0	0	0
Chili, bars ,, ...	42	5	0	42	12	6
YELLOW METAL....lb.	0	0	4½	0	0	4½
LEAD—Pig, Spanish	11	10	0	0	0	0
English, com. brands	12	0	0	0	0	0
SPELTER—						
Silesian, special ....ton	14	10	0	0	0	0
Ordinary brands	14	5	0	0	0	0
TIN—						
Straits	90	10	0	91	0	0
Australian	90	10	0	91	0	0
English ingots....	93	0	0	0	0	0
TINPLATES—						
IC coke ....box	14	6	0	16	6	0
IX ditto	21	0	0	25	0	0
IC charcoal	17	0	0	20	0	0
IX ditto	26	0	0	27	0	0

OILS.						
Linseed ....ton	21	17	6	22	10	0
Cocoanut, Cochin	31	0	0	32	0	0
Ceylon	26	15	0	27	0	0
Copra....	26	0	0	26	10	0
Palm, Lagos	29	10	0	30	0	0
Palm-nut Kernel	26	0	0	0	0	0
Rapeseed, English pale....	25	10	0	0	0	0
,, brown	23	10	0	23	15	0
Cottonseed, refined	21	10	0	22	10	0
Tallow and Oleine	25	0	0	45	0	0
Lubricating, U.S.	7	0	0	10	0	0
,, Refined	8	0	0	15	0	0
TURPENTINE—						
American, in cks. ....cwt.	1	6	6	1	6	9
TAR—Stockholm ....brl.	1	2	0	1	2	6
Archangel....	0	13	0	0	13	6

TENDERS.

ABINGDON.—For the erection of bank at Abingdon, Berks, for the London and County Banking Company (Limited). Mr. Charles Bell, architect. Quantities by Mr. Henry Lovegrove:—

W. Woodbridge, Maidenhead	£4,080	0	0
T. Rider & Son, Southwark	3,728	0	0
Lymm & Co., Oxford	3,710	0	0
Edward Parsons, Wandsworth	3,688	0	0
Edward Williams, Abingdon	3,357	0	0
F. N. Kingerlee, Oxford (accepted)	3,170	0	0

BECKENHAM (Kent).—For rebuilding Beckenham Village Bridge. Quantities supplied by Messrs. Ruck, Son, & Smith, Maidstone:—

C. J. Slade, Maidstone	£800	0	0
James Angood, Frensbury Park....	675	0	0
G. Bell, Tottenham....	598	0	0
Money Marsland, Chislehurst....	583	0	0
J. B. Church, Bromley....	580	0	0
J. G. B. Marshall, Brighton	572	0	0
Robson, Snaresbrook	563	0	0
Hocking & Tuttlebee, Strood	542	10	0
James Farrow, Maidstone	535	17	0
Richard Avard, Maidstone	528	0	0
T. W. Jones, Beckenham....	513	0	0
George Roberts, South Norwood....	500	0	0
Ball & Gammon, Strood....	500	0	0
Wilkins, Maidstone	480	0	0
E. Bentley, Rochester	480	0	0
T. Lye, Sutton (accepted)....	465	0	0

BLACKHEATH.—For building All Saints' Vicarage, Blackheath. Mr. Tabberer, architect:—

F. Mark	£2,477	0	0
Rider & Son	2,460	0	0
E. Blow	2,332	0	0
Kirk & Randall	2,329	0	0
Higgs & Hill	2,243	0	0
Conder....	2,171	0	0
Colls & Son....	2,076	0	0

COMPETITIONS AND CONTRACTS.

Epitome of Advertisements in this Number.

COMPETITIONS.

Nature of Work.	By whom required.	Premium.	Designs to be delivered.	Page.
Laying-out "Harold Tower" Grounds, Douglas, Isle of Man	Owners of "Harold Tower"	25*l.*	Sept. 10th	ii.

CONTRACTS.

Nature of Work, or Materials.	By whom required.	Architect, Surveyor, or Engineer.	Tenders to be delivered.	Page.
House and Shop, Kilburn	.....	E. Monson, Jun.	Sept. 8th	ii.
Kerbing, Tar Paving, &c.	Lewisham Brd. of Wks.	*Official*	do.	ii.
Water-Meters	Barking Town Locl Brd	do.	Sept. 10th	xviii.
Completion and Decoration of Houses, Waldegrave-road, Teddington, and Warrington-road, Richmond	Moore, Lucas, & Co.	.....	do.	xviii.
Enlargement of W. District Post-Office	Com. of H.M. Works	*Official*	Sept. 14th	ii.
Over Bridge and Subway	Brecon and Merthyr Rl.	do.	do.	ii.
Repairs to Footbridge	Vestry St. Mary Abbotts, Kensington	W. Weaver	Sept. 15th	ii.
Barging away House Refuse, &c.	Greenwich Bd. of Wks.	*Official*	Sept. 16th	xviii.
Sewering and Making-up Roads	Chiswick Local Board	A. Ramsden	do.	ii.
Brick & Wood Work, for Exhibition Buildings	Liverpl. Exhibition, 1886	H. Sumners	Sept. 21st	ii.
Paving and Road-making	Beckenham Local Board	G. B. Carlton	do.	xviii.
Enlargement, Leicester Post-Office	Com. of H.M. Works...	*Official*	do.	ii.
Free Public Library	Wimbledon Local Brd.	Potts, Sulman, & Hennings	do.	ii.
Water-pipes, Valves, Hydrants, &c.	Guardians, Petersfield...	H. Robinson	Sept. 22nd	ii.
Well-Sinking	Tottenham Local Board	— De Pape	do.	ii.
Well-Sinking, Reservoirs, Cast-Iron Mains, Engines, &c.	Southampton Corporatn	W. Matthews	do.	ii.
Board School, Edge Hill	Liverpool School Brd.	C. O. Ellison & Son	do.	ii.
Scavengers' Depot	Com. of Sewers	*Official*	Sept. 25th	ii.
Sewerage Works	Wednesbury U. S. A.	E. Pritchard	Sept. 26th	ii.
Sewerage Works	Hereford Town Council	J. Parker	Sept. 29th	ii.
Road-making and Paving, Victoria Docks	.....	.....	Not stated	xviii.
Diversion of Ditch and Culverts	Lands Allotment Co. Lim	Bradshaw Brown	do.	xviii.

BRENTFORD. — For additions to warehouse and stabling, for Messrs. Carter, Paterson, & Co., under the superintendence of Mr. William Eve, Union-court, Old Broad-street :—

Aldridge & Jenvey	£2,410	0	0
Erton	2,397	0	0
Harris & Wardrop	2,380	0	0
Higgs,* Loughborough Junction	2,280	0	0
Dorey (error) withdrawn	1,490	0	0

* Accepted.

CAMBERWELL.—For additions to schools, Waterloo-street, Camberwell. Mr. R. H. Hill, architect :—

O. Craske	£1,270	0	0
Holloway Bros.	1,260	0	0
J. Holland	1,216	0	0
W. Shurmur	1,215	0	0
J. C. Arnaud & Son	1,204	0	0
B. E. Nightingale	1,187	0	0
Harris & Wardrop	1,143	0	0

CLERKENWELL.—For the erection of new church, for the Trustees. Messrs. Lander & Bedells, architects. Quantities by Mr. S. Young :—

Dove Bros.	£8,975	0	0
Williams Bros.	8,960	0	0
Roberts	8,839	0	0
Nightingale	8,770	0	0
Grover	8,749	0	0
Mattock Bros.	8,691	0	0
Smith & Son	8,650	0	0
Wall Bros.	8,393	0	0
J. Allen & Sons (accepted)	8,200	0	0
Wontner Smith & Son	7,900	0	0

CODSALL.—For gardener's lodge to residence, for Mr. R. Fryer Morson. Mr. J. R. Veall, architect, Wolverhampton :—

Horsman & Co.,* Wolverhampton	£271	0	0

* Accepted.

ELTHAM.—For warehouse and stabling, with manager and horsekeeper's houses, for Messrs. Carter, Paterson, & Co., under the superintendence of Mr. William Eve, Union-court, Old Broad-street :—

Killingback	£3,160	0	0
Clarke & Bracey	2,914	0	0
Brass & Son	2,850	0	0
Aldridge & Jenvey	2,820	0	0
Adamson	2,783	13	4
Downs	2,769	0	0
Perry	2,747	0	0
Morter	2,738	0	0
Harris & Wardrop	2,723	0	0
Higgs,* Loughborough Junction	2,720	0	0

* Accepted.

EPSOM.—For the new sewerage works. Mr. J. R. Harding, C.E., Town Surveyor. Quantities by Mr. Rowell :—

Rowland	£5,317	0	0 !
Carter	4,111	0	0
Harris	3,533	0	0
Williams	3,401	0	0
Bentley	3,227	0	0
Munday	3,200	0	0
Streeter	3,144	0	0
Cowdery & Sons	3,055	0	0
Way	3,000	0	0
Peale	2,796	0	0
Cooke & Co.	2,730	0	0
Nicholls	2,695	0	0
Woodham & Fry	2,673	0	0
J. Jackson	2,655	0	0
Killingback	2,498	0	0
Beadle Bros.	2,438	0	0
Bottoms Bros.	2,400	0	0 !

HAMPTON WICK.—For proposed new house, Seymour-road, Hampton Wick, for Mr. E. A. Wright. Mr. R. T. Elsam, architect, Hampton Wick. Quantities by the architect :—

G. Constable, Hampton Wick	£1,536	7	0
J. H. Jarvis, Surbiton	1,495	0	0
C. Bonell, Teddington	1,495	0	0
C. E. Oldridge & Sons, Norbiton	1,472	0	0
J. F. Collinson, Teddington	1,470	0	0
T. Wontner Smith & Son, Essex-road	1,379	0	0
W. Hickinbotham, Teddington (too late)	1,295	0	0
J. Piller, Teddington (accepted)	1,290	0	0

KILBURN.—For works at the Brondesbury Arms, Canterbury-road, Kilburn :—

Stevens	£470	0	0
McGregor	408	0	0
Mark	348	0	0
Richardson	344	0	0

LEICESTER.—For first portion of Church of St. Michael, Belgrave, Leicester. Mr. G. Vialls, architect, London. Quantities by Mr. E. A. Jackson :—

Thrall & Payne, Leicester	£5,043	0	0
Law & King, Lutterworth	5,009	0	0
T. & H. Herbert, Leicester	4,704	2	0
F. Major	4,411	15	0
G. Hewitt*	4,310	0	0
H. Bland	3,994	3	1

* Accepted in part and conditionally.

LEYTONSTONE.—For alterations and additions to Woodhouse Tavern, Leytonstone. Mr. F. A. Ashton, architect, Forest-gate :—

Hearle & Son	£650	0	0
Buckle	550	0	0
Nicholls, Leytonstone (accepted)	530	0	0

LLANDUDNO.—For entrance-lodge on the Little Orme's Head, Llandudno, for Mr. John Smith. Mr. Edwin Turner, architect :—

Jones & Owen	£650	0	0
Thomas Jones	645	8	6
R. Conway	591	0	0
Wm. Williams (accepted)	520	6	0

LLANDUDNO.—For offices, Llewelyn-street, Llandudno, for Messrs. Minshuls, Parry, Jones, & Pugh. Mr. Edwin Turner, architect :—

Hughes & Jones (accepted)	£1,500	0	0

LLANDUDNO.—For alterations to Bryn Maelgwyn, Llandudno, for Mr. Pugh. Mr. Edwin Turner, architect :—

R. Conway	£435	0	0
Wm. Williams	421	0	0
T. Jones (accepted)	395	10	0

LONDON.—For erection of Coach and Horses public-house, and warehouse adjoining, Whitechapel High-street. Mr. Geo. Low, architect :—

Dove Bros.	£3,275	0	0
Patman & Fotheringham	3,273	0	0
R. Marr	3,198	0	0
W. Shurmur	3,150	0	0
R. Conder	3,053	0	0
Holliday & Greenwood	2,973	0	0

LONDON.—For rebuilding 7, Oxford Market, London, for Mr. G. H. Heinke. Messrs. H. M. & W. Grellier, architects. Quantities by Mr. F. T. W. Miller :—

S. G. Bird	£1,214	0	0
J. Simpson & Son	1,200	0	0
T. Little	1,197	0	0
G. S. Pritchard & Son	1,186	0	0
C. Manning	1,050	0	0
J. Outhwaite & Son	1,048	0	0

LONDON.— For alterations, &c., to the Old King's Arms, Hoxton-street. Mr. B. J. Capell, architect :—

G. Keetch	£825	0	0
Jackson & Todd	810	0	0
W. Shurmur	747	0	0
J. Ivory	725	0	0

LONDON.—For alterations, painting, decorating, &c., at 8, Hertford-street, Mayfair. Mr. J. Williams, architect :—

G. Sinclair	£1,038	0	0 !
Priestley	660	0	0
Wetherilt, Lee, & Martin	595	6	6 !

LONDON.—For works at Messrs. Oetzmann's premises, Hampstead-road. Messrs. Eales & Son, architects :—

Simpson & Son	£1,800	0	0
Scrivener & Co.	1,676	0	0
Mark	1,644	0	0
Downs	1,487	0	0

LONDON. — For alterations at the Portman Arms, Great Quebec-street. Mr. Newton, architect :—

Bowman & Son	£307	0	0
Mark	277	0	0
Lamble	259	0	0

LONDON. — For works at 10, New Quebec-street. Messrs. New & Son, architects :—

Johnson	£263	0	0
Thomas & Butland	234	10	0
Flowers	225	0	0
Mark	219	0	0

LOWESTOFT.—For the erection of lodge, mortuary-chapel, lich-gate, boundary-walls, and laying out of grounds at Lowestoft Cemetery, for the Burial Board. Mr. William Doubleday, architect, Colmore-row, Birmingham. Quantities by Mr. George Kenwrick, Temple-street, Birmingham :—

Kenny, Ipswich	£3,898	0	0
Bate, Lowestoft	3,452	0	0
Bray, Yarmouth	3,345	0	0
Guymer & Wilkins, Lowestoft	3,250	0	0
R. Marris, Ditchingham	3,225	16	0
Brown, Braintree	3,170	0	0
Swatman, Lowestoft	3,165	0	0
Young & Son, Norwich	3,081	0	0
Bedwell, Lowestoft (accepted)	2,975	0	0

MAIDSTONE.—For the erection of boundary-wall at Wren's Cross Police Station. Quantities supplied by Messrs. Ruck, Son, & Smith, Maidstone :—

H. J. Smith	£335	8	0
Edmund Vaughan	285	0	0
Richard Avard	281	0	0
Cox Bros.	280	0	0
Wallis & Clements (accepted)	247	10	0

[All of Maidstone.]

NORTH PETHERWIN.—For farm at North Petherwin, Cornwall (exclusive of stone for all walls, which is to be provided by the owner), for Mr. A. V. Box. Mr. F. W. Lacey, architect, Brentford :—

W. Burt, Launceston (accepted)	£750	0	0

PLUMSTEAD.—For erection of church and hall in Herbert-road. Mr. J. Kingwell Cole, architect, Mount-street, Grosvenor-square. Messrs. Battam & Co., surveyors :—

E. Proctor, Woolwich	£5,100	0	0
Priestley & Gurney, Hammersmith	4,523	0	0
Strickland Bros., Belvedere	3,882	0	0
C. E. Skinner, Chatham	2,980	0	0
W. G. Covil, Woolwich	2,750	0	0
W. J. Brown, Plumstead	2,698	0	0

RICHMOND (Surrey).—For the supply of 500 super. yards of hard Yorkshire stone paving, 2½ in. thick, at per yard super., for the Richmond (Surrey) Select Vestry. Mr. Walter Brooke, Town Surveyor :—

	A†		B‡	
	s. d.		s. d.	
J. Munro, Richmond	6 0	.....	5 7	
S. Trickett & Son, Millwall	—	.....	5 4	
Nowell & Robson, Kensington	—	.....	5 4	
E. Webster & Co., Eccleshill	—	.....	5 3	
Tomes & Wimpey, Hammersmith	5 4½	.....	5 2	
T. Aspinall, Brighouse	—	.....	5 2	
J. Brooke & Sons, Halifax	—	.....	5 2	
C. Fitch, Oxford-street	5 6	.....	5 0	
J. G. B. Marshall, Brighton	5 3	.....	5 0	
S. H. Watkins & Co., Brentford	5 0	.....	4 11	
W. Rhodes, Shipley, Yorks	—	.....	4 10	
H. J. Jennings, Halifax	—	.....	4 10	
Camm Bros. & Co., Brighouse	4 11*	.....	4 8½	

[One tender received too late (not opened); one not according to instructions.]

* Accepted.

A† Delivered at the Parish Yard.

B‡ Delivered at the Richmond Railway Station.

ROTHERHITHE.—For new boundary-wall to Holy Trinity Vicarage, Rotherhithe. Mr. J. Llewellen Wilson, architect :—

J. Bulmer, Rotherhithe	£195	0	0
G. F. Williams, Pimlico	156	0	0
Puzey & Lumley, Long-acre	146	0	0
Alfred Roome, Clapton (accepted)	137	0	0

SEVENOAKS.—For house, &c., at Sevenoaks, for Mr. H. Sowerby. Mr. E. E. Cronk, architect :—

Punnett	£3,327	0	0
Durtnell	3,323	0	0
Constable	3,286	10	9
Botterill	3,241	0	0
Wilsher	3,017	0	0
Duncan (too late)	2,921	12	4

SPITALFIELDS.—For new rag warehouse, Fashion-street, Spitalfields. Mr. Andrew Edwards, architect :—

G. Brady, Spitalfields	£695	0	0
J. F. Sargeant, Hackney	666	0	0
W. W. Exton, Kingsland	573	0	0
J. Howlett, Limehouse (withdrawn)	346	10	0

WINDSOR.—For sanitary improvements at the Royal Infirmary. Mr. Mark H. Judge, architect, London :—

Crapper, Chelsea	£487	0	0
Toten & Sons, Kensington	430	0	0
Stidder, Southwark	420	0	0
Burman, Enfield	365	0	0
Hollis, Windsor	358	0	0
Reavell, Windsor	330	0	0
Sevenoakes, Windsor	324	10	0
Deverill, Slough (accepted)	299	0	0
Knight, Westminster	257	0	0

RICHMOND (Surrey).—For the supply of road materials, as under, for the Richmond (Surrey) Select Vestry. Mr. Walter Brooke, Town Surveyor:—

	760 yards Broken Guernsey Granite.	250 yards Broken Penlee Stone from the Elvin Quarries, Penzance.	2,000 yards Chalk Flints.	500 yards Brown or Pit Flints.	300 yards Broken Granite or Penlee Siftings.
	cubic yd.	cubic yd.	cubic yd.	cubic yd.	cubic yd.
	s. d.	s. d.	s. d.	s. d.	s. d.
J. G. B. Marshall, Brighton	13 6	*13 6	6 8	5 8	10 6
Nash & Miller, Battersea	—	—	6 2	5 6	—
Craske & Co., Surbiton	—	—	5 9	—	—
C. & S. Frere, Cannon-street	13 11	—	5 8	—	—
S. Trickett & Sons, Millwall	13 9	—	—	—	10 0 ton
A. & F. Manuelle, Leadenhall-street	13 1	—	—	—	10 9
J. Mowlem & Co., Westminster	13 2	—	—	—	10 5
Nowell & Robson, Kensington	12 6	—	—	—	9 5
J. Neal, Wandsworth	—	—	—	5 0	—
Wills & Packham, Sittingbourne	—	—	—	4 10	—
G. Pearce, Brentford	—	—	4 9	4 9	—
Downs, Kennedy, & Co., Mark-lane	*12 4	—	*4 8	4 5	*8 11
R. L. & J. Fennings, London Bridge	12 0	—	—	—	—
Fredk. Sims, Richmond	—	—	—	* Native Flints 3s. 6d. at the pit, or delivered to any part of Richmond 4s. 9d.	—

[Two tenders received too late; two not according to instructions.]
* Accepted tenders.

WOLVERHAMPTON.—For new stabling, and alterations to residence, Vale Head, Wightwick, for Mrs. Arthur Briscoe. Mr. J. R. Veall, architect, Wolverhampton:—

	Stabling.	Residence.
H. Lovatt	£732 0 0	£773 0 0
G. & F. Higham	703 0 0	730 0 0
Horsman & Co.*	724 18 10	657 6 1
Bradney & Co.	678 0 0	677 0 0

* Accepted.
[All of Wolverhampton.]

WOOD GREEN (Middlesex).—For alterations and additions to Waterloo House, Wood-green. Mr. J. E. Pinder, architect:—

G. S. Wilson & Co.	£1,285 0 0
J. Linsell	1,218 0 0
W. Shurmur	1,143 0 0
G. Vears	947 0 0

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